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**SOME FACTORS INFLUENCING HOSPITAL
UTILIZATION IN SASKATCHEWAN**

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**CONCENTRATED TETANUS TOXOID
ADMINISTERED INTRANASALLY
AS A RECALL DOSE**

F. O. Wishart and M. Jean MacQuarrie

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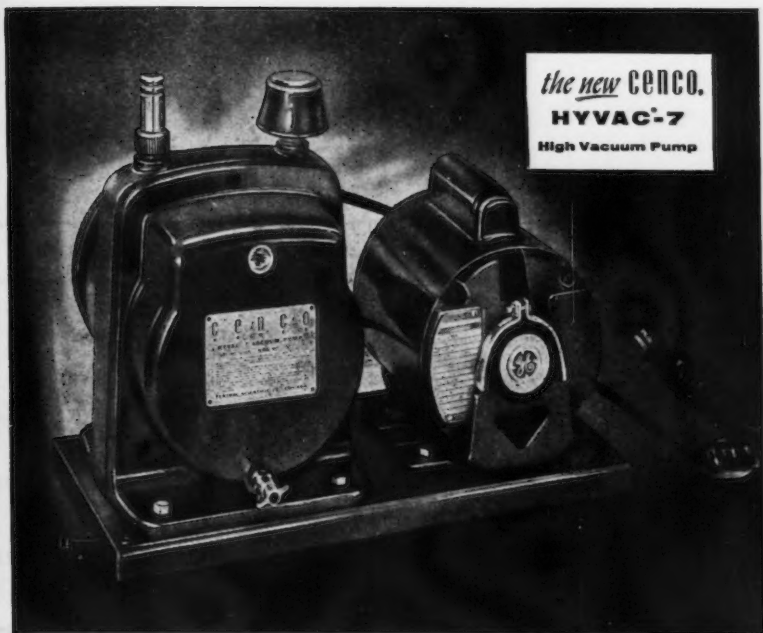
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Some Factors Influencing Hospital Utilization In Saskatchewan

An Interim Report

F. B. ROTH, M.D., M. S. ACKER, M.D.
M. I. ROEMER, M.D. AND G. W. MYERS
*Saskatchewan Department of Public Health
Regina, Saskatchewan*

IT has been generally assumed by the public, and widely assumed by professional health personnel, that the reason most persons are hospitalized is because they are sick, without going further and trying to define sickness. Thinking on the need for hospital facilities has often tended to become obscured by such generalizations; in many instances the supposed need for hospital services has been based on some mathematical formula by which only the grossest form of measurement could be made. On the other hand, the capacity to pay for care has often influenced the amount of hospitalization provided. Experience seems to be teaching us that there are numerous other factors which influence the amount of hospital care provided and the purpose of this paper is to initiate a study of at least some of these factors.

Since the inauguration of the Saskatchewan Hospital Services Plan in 1947 there has been a marked rise in over-all utilization of hospitals in Saskatchewan. Utilization for purposes of this paper is measured in terms of the number of persons discharged in a year from hospital per 1,000 population covered by the comprehensive hospital insurance plan, or may be described in specific instances in terms of the number of days of care provided annually to a population unit.

Utilization rates for the province as a whole rose from 156 discharges per 1,000 covered population in 1947 to 200 per 1,000 in 1949. It then levelled off and has been successively 200, 203, 199, 205, 206 in the years 1949 to 1953 inclusive.

Coincident with the establishment of the hospital insurance program, an active hospital building program was under way. From 1944 to 1950 the

TABLE I
DISTRIBUTION OF URBAN AND RURAL AREAS IN SASKATCHEWAN
ACCORDING TO INCIDENCE OF HOSPITALIZATION, 1950-1952

Hospital cases per 1,000 persons	All areas			Urban centres over 1,000			Rural areas*		
	1950	1951	1952	1950	1951	1952	1950	1951	1952
Total	363	357	359	35	36	38	328	321	321
0-129	17	15	8	-	1	-	17	14	8
130-159	41	47	33	2	1	2	39	46	31
160-189	71	78	72	8	6	5	63	72	67
190-219	93	84	90	9	8	12	84	76	78
220-249	62	64	72	6	10	9	56	54	63
250-279	27	36	38	2	7	4	25	29	34
280-309	27	20	24	3	1	4	24	19	20
310-339	15	8	15	2	-	-	13	8	15
340+	10	5	7	3	2	2	7	3	5

*Each rural municipality and local improvement district plus the urban centres of less than 1,000 population within its boundaries is counted as one area. The Northern Saskatchewan Administration District and the Prince Albert National Park are each counted as one area.

number of hospital beds per 1,000 population nearly doubled. It is obvious that there is a relationship between the rise in utilization and the virtual removal of financial deterrents to hospitalization and the increase in hospital beds and facilities.

Within the province it has long been noted that there are great variations in the utilization of hospital care among different communities. Exactly what are the factors which influence these widely varying rates of utilization? To what extent are they related to the volume of disease, to the supply of beds, to the level of housing of the population, to geographic dispersion, to the supply of doctors and so forth?

An interesting feature of the variations in utilization rates among localities is that the rates which are especially high or low have become a rather stable characteristic of the population of certain communities. It seemed evident that the factors contributing to high or low utilization have been continuing factors over the past few years.

METHOD OF STUDY

It was decided that the social, medical and other factors contributing to hospital utilization might be subject to analysis by a detailed comparison of localities with very high and very low hospital utilization rates. It was considered that by choosing the areas at the upper and lower ends of a distribution of utilization rates, it would be possible to identify more readily the factors involved. Accordingly, data have been obtained on the 50 localities with the highest utilization rates in the province and the 50 localities with the lowest utilization rates in the calendar year 1952. For the purposes of preliminary analysis the hospitalization rate was determined on the basis of the number of hospital discharges annually per 1,000 population covered by the Saskatchewan Hospital Services Plan. Since the Plan covers approximately 93 per cent of the total population of the province, it was felt that the experience of the Plan beneficiaries would be fairly representative of the experience of the entire population of the areas concerned. The percentage of total population who are beneficiaries of the Plan is virtually equal in all areas concerned in the study.

A point of interest in the method of recording Hospital Plan statistics might be made at this time. Registration of beneficiaries is recorded by place of residence. That is, a beneficiary is recorded by city, town, village or rural municipality where he resides. Accordingly, all hospitalization can be recorded by place of residence whether a beneficiary is hospitalized in the local community hospital, another hospital in Saskatchewan or elsewhere.

For purposes of this study rates of utilization have been calculated for three types of areas: (a) a rural municipality or an unorganized local improvement district including the hamlets or villages of less than 1,000 population within its borders, (b) an urban municipality of over 1,000 population, (c) the Northern Saskatchewan Administration District covering the northern half of the province and Prince Albert National Park.

In order to ascertain that the 1952 data analyzed in this study did not represent an unusual or selected experience, a distribution of all urban and rural areas according to incidence of hospitalization for 1950, 1951 and 1952 was tabulated. Table I, where these findings are presented, indicates that the provincial rate of utilization has not changed significantly during these three years. The average number of cases per 1,000 population hospitalized in the entire province was 203,199 and 205 for each of the three years respectively. Moreover, in general, the distribution of urban and rural areas according to rates of utilization did not vary significantly over this three-year period, indicating that the 1952 data are not unusual.

Table II indicates the experience of the 100 sample areas chosen on the basis of their 1952 experience. It is noted that the 50 areas having the highest utilization in 1952 had substantially high rates of utilization in 1950 and 1951. A similar experience is evident for the 50 low areas. The average rate of utilization in the 50 high areas was 311 per 1000 in 1952, as contrasted with an average rate of 148 in the 50 low areas.

TABLE II
FIFTY AREAS WITH HIGHEST AND FIFTY AREAS WITH LOWEST
HOSPITALIZATION RATES IN 1952 ACCORDING TO FREQUENCY
OF HOSPITALIZATION AMONG RESIDENTS, 1950-1952

Hospital cases per 1,000 persons	1950		1951		1952	
	High	Low	High	Low	High	Low
Total	50	50	50	50	50	50
0-129	—	12	—	6	—	5
130-159	—	17	—	27	—	30
160-189	—	13	1	17	—	15
190-219	7	6	—	—	—	—
220-249	5	2	8	—	—	—
250-279	10	—	12	—	6	—
280-309	14	—	15	—	22	—
310-339	4	—	8	—	15	—
340 +	10	—	6	—	7	—

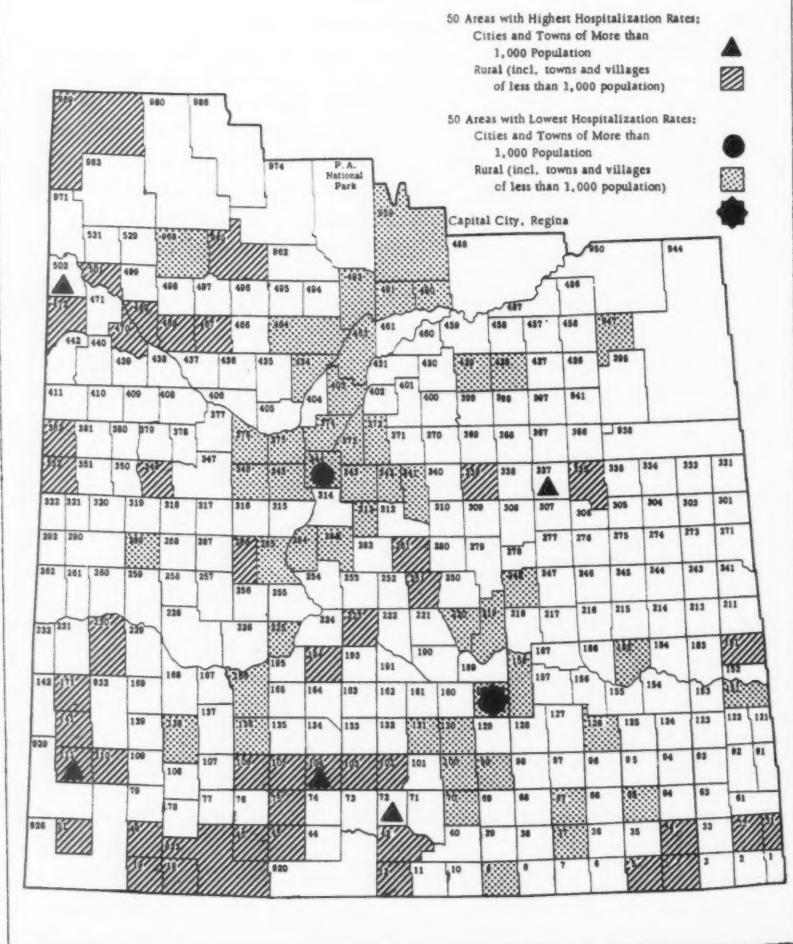
FACTORS INFLUENCING HOSPITALIZATION

Population

A glance at Fig. 1 would seem to indicate that the spacial distribution of the 50 high and 50 low areas is not accidental. There appears to be a clumping of the low utilization areas around three major cities, with the areas having

higher utilization rates being located at greater distances from the cities. The experience of the Hospital Plan would suggest that there is a lower number of cases admitted to hospital from urban areas. If we go beyond the 50 low and 50 high areas under study, as Myers has reported previously, the utilization rate in 1952 was 172 cases per 1,000 covered population in cities, 223 cases per 1,000 in towns, 242 in villages and 209 in rural municipalities. One of our first conclusions might therefore be that one of the factors influencing the level of hospitalization experience is the factor of rurality. This seems true

Fig. 1. AREAS WITH HIGHEST AND LOWEST HOSPITAL ADMISSION RATES, SASKATCHEWAN, 1952.



in a broad way, but as yet unexplained is why the highest rates are often found in villages. This high village rate remains after the rates are age-sex adjusted.

As we look at the urban and rural covered population in Table III it is noted that in the 50 areas with the lowest utilization, 38 per cent of the population live in an urban area while in the high utilization areas only 10 per cent are urban. There might be some question as to the significance of this in view of the fact that this 38 per cent represents the population of one city. It might be argued that one of the reasons for low utilization by residents of that city is a smaller than average ratio of beds available to population there. Nevertheless, the utilization rates are known to be low also in other cities, where the supply of beds is greater.

The ecological comparisons within rural areas are probably more enlightening. If we examine the rural areas involved in our study (Table IV) there is an apparent relationship between density of population and hospital utilization. The rural areas with fewer persons per square mile seem to yield higher utilization rates.

TABLE III
URBAN AND RURAL DISTRIBUTION OF COVERED POPULATION IN
AREAS WITH HIGHEST AND LOWEST HOSPITALIZATION RATES, 1952

Type of community	50 areas with highest rates	50 areas with lowest rates
	Number of persons	
All types of community	69,392	139,835
Cities (over 5,000 population)	—	53,092
Towns (1,000-5,000 population)	7,128	—
Rural (including towns and villages under 1,000)	62,264	86,743
	Percentage distribution	
All types of community	100.0	100.0
Cities (over 5,000 population)	—	38.0
Towns (1,000-5,000 population)	10.3	—
Rural (including towns and villages under 1,000)	89.7	62.0

TABLE IV
POPULATION DENSITY IN AREAS* WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952

Population density: persons per square mile	Areas with highest rates		Areas with lowest rates	
	Number	Per cent	Number	Per cent
Total	45*	100.0	49*	100.0
1.9 or less	5	11.2	—	—
2-2.9	7	15.6	3	6.1
3-3.9	10	22.2	6	12.3
4-4.9	10	22.2	9	18.4
5-5.9	6	13.3	12	24.5
6-6.9	2	4.4	8	16.3
7-7.9	2	4.4	5	10.2
8+	3	6.7	6	12.2

*Rural areas only.

SOURCE: Census of Canada, 1951.

The age and sex distribution of the population in the two study groups of areas seems to show little of significance. The percentage distribution of the various age groups seems to be reasonably comparable as noted in Table V.

There are proportionately more males than females in the areas of high use. It is not felt, however, that any differences in the age-sex distribution between the high and low areas can explain the wide variation in the utilization of hospital services.

TABLE V
AGE AND SEX DISTRIBUTION OF COVERED POPULATION IN AREAS
WITH HIGHEST AND LOWEST HOSPITALIZATION RATES, 1952

Item	All ages	Age in years							
		0-1	1-4	5-14	15-24	25-44	45-64	65-69	70 +
	Number of persons								
50 Areas with highest rates									
Both sexes	69,392	1,720	6,886	13,914	10,308	18,392	12,095	2,677	3,400
Male	36,821	860	3,633	7,161	5,233	9,509	6,694	1,677	2,054
Female	32,571	860	3,253	6,753	5,075	8,883	5,401	1,000	1,346
50 Areas with lowest rates									
Both sexes	139,835	3,502	13,005	25,052	21,470	38,809	25,874	5,144	6,979
Male	71,906	1,761	6,771	12,969	10,574	19,112	13,865	2,945	3,909
Female	67,929	1,741	6,234	12,083	10,896	19,697	12,009	2,199	3,070
	Percentage distribution								
50 Areas with highest rates									
Both sexes	100.0	2.5	9.9	20.0	14.9	26.5	17.4	3.9	4.9
Male	100.0	2.3	9.9	19.4	14.2	25.8	18.2	4.6	5.6
Female	100.0	2.6	10.0	20.7	15.6	27.3	16.6	3.1	4.1
50 Areas with lowest rates									
Both sexes	100.0	2.5	9.3	17.9	15.4	27.7	18.5	3.7	5.0
Male	100.0	2.5	9.4	18.0	14.7	26.6	19.3	4.1	5.4
Female	100.0	2.6	9.2	17.8	16.0	29.0	17.7	3.2	4.5

The structure of families appears to be slightly different in the two study areas. Table VI shows that there are proportionately more single persons in the areas with the lowest rates and that family size increases in the areas with high rates. One might speculate on the effect of crowded housing but we have as yet not been able to obtain data on this point.

The income level of the population is a major determinant of the environmental conditions in a community. It has frequently been demonstrated that the general incidence and prevalence of illness, at least, tended to be higher

TABLE VI
COVERED POPULATION ACCORDING TO FAMILY SIZE IN AREAS WITH
HIGHEST AND LOWEST HOSPITALIZATION RATES, 1952

Number of persons in family unit*	Number of taxpayers†		Percentage distribution of taxpayers		Number of beneficiaries		Percentage distribution of beneficiaries	
	50 Areas with highest rates	50 Areas with lowest rates	50 Areas with highest rates	50 Areas with lowest rates	50 Areas with highest rates	50 Areas with lowest rates	50 Areas with highest rates	50 Areas with lowest rates
Total	28,322	60,853	100.0	100.0	69,392	139,835	100.0	100.0
1	12,795	28,315	45.2	46.5	12,795	28,315	18.5	20.3
2	5,456	12,319	19.3	20.2	10,912	24,638	15.7	17.6
3	3,004	7,003	10.6	11.5	9,012	21,009	13.0	15.0
4	3,059	6,548	10.8	10.8	12,236	26,192	17.6	18.7
5	1,842	3,488	6.5	5.7	9,210	17,440	13.3	12.5
6	1,077	1,619	3.8	2.7	6,462	9,714	9.3	6.9
7	537	768	1.9	1.3	3,759	5,376	5.4	3.8
8	252	387	0.9	0.6	2,016	3,096	2.9	2.2
9	148	194	0.5	0.3	1,332	1,746	1.9	1.3
10+	152	212	0.5	0.4	1,658	2,309	2.4	1.7

*The term "family unit" includes all persons in a family covered by the maximum hospitalization tax of \$30 except that an unknown number of students between 18 and 21 years have been listed as single adults because of the basis on which tax collections are reported.

†Heads of families or adults without dependents.

in areas of low income and economic worth. Many studies have shown this to be true when dealing with communities or groups at or near minimal levels. How well this generalization applies in Saskatchewan in the 1950's when overall financial returns are at their highest level in history is not certain.

We have not as yet been able to obtain complete income data for the small localities used in this study. However, data on "estimated farm value" and "taxable assessment" have been obtained and these are at least an indirect reflection of the capital wealth of the population in the high and low utilization areas. The usefulness of this type of index for urban areas might be questioned since many extraneous factors creep in. This is particularly true in an economy where the urban areas are largely distributing centres rather than primary producing centres themselves. We feel, however, that acreage values for farms are a reasonable economic index of the rural population. Table VII indicates that in the areas of low utilization the mean value per acre in each municipality is 50 per cent higher than in the areas of high utilization. When this index is viewed in terms of mean farm value per capita, a different picture is seen. The farm value per person is slightly higher in the areas of high utilization than in the low areas. We are not too certain of the meaning of this but we suspect that the data have been influenced by the succession of good crop years. In other words, low farm values may be inflated because of unusual climatic and economic circumstances.

TABLE VII
OCCUPIED FARM VALUE IN AREAS* WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952

Value per acre of occupied farms	Areas of highest utilization		Areas of lowest utilization	
	Number	Per cent	Number	Per cent
Total	45	100.0	49	100.0
\$10 or less	1	2.2	—	—
10-19.99	13	28.9	2	4.1
20-29.99	19	42.2	10	20.4
30-39.99	8	17.8	25	51.1
40-49.99	4	8.9	6	12.2
50-59.99	—	—	3	6.1
60-69.99	—	—	2	4.1
70 Plus	—	—	1	2.0
Mean occupied farm value per acre	\$24.79		\$36.59	
Mean occupied farm value per capita	\$4,684		\$4,601	

*Rural areas only.

SOURCE: Census of Canada, 1951.

There are a number of fields of study which might be of interest but for which information is not currently available. The effect of housing can probably be expected to be substantial on the desire for hospitalization and, in fact, on the need in many cases. Adequate data are not yet available on this aspect, but our observations have indicated to us a general impression that housing is less adequate in the areas of high utilization. We intend to study this further.

Educational level may have some impact on the tendency of families to seek medical service, but no data on the educational levels in the study areas are available. Furthermore, we believe that ethnic background may contribute to habits of hospital utilization but data on this are still to be sought.

Facilities and Personnel

The supply of hospital beds, of course, influences the possibility of hospital utilization. It has been pointed out previously that the rate of admissions seemed to be in direct relationship to the number of beds available. This may be an over-simplification of the situation because road conditions, a high rural vehicle-to-population ratio and a disregard for distance permit the highly flexible utilization of hospitals in localities at great distance from the patient's place of residence. Nevertheless, there is a natural tendency to utilize the nearby hospital and our studies have shown that natural "hospital service areas" can be drawn. Computations have been made of the proportion of general hospital beds to population in each hospital service area in which the 50 high and 50 low study areas are located. These findings are shown in Table VIII.

TABLE VIII
BED-POPULATION RATIOS IN AREAS WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952*

Number of beds* per 1,000 population	Areas with highest rates	Areas with lowest rates
	Number of areas	
Total	50	50
Less than 4.0	1	10
4.0-5.9	5	12
6.0-7.9	11	14
8.0-9.9	15	6
10.0+	18	8
Mean number of beds per 1,000	9.3	7.2

*Refers to bed complement or beds actually set up.

It will be noted that the supply of beds in the areas of high utilization is about 30 per cent greater than in the areas of low utilization. While this strikingly suggests that high utilization is related to a greater bed supply, it is interesting that the differential is much lower than the 2 to 1 ratio of discharges, (that is, 311 discharges per 1,000 population in the high areas to 148 in the low). One might ask, therefore, whether the large supply of beds in the areas of high utilization is the cause or result of the high demand for beds. It seems likely that other factors are involved which explain the differential in utilization between the two groups of areas.

The availability of physicians doubtless influences admissions to hospitals but perhaps not in the manner sometimes suggested. As shown in Table IX,

TABLE IX
PHYSICIAN SUPPLY* IN AREAS WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952

Area	Total population of hospital service areas	Number of active physicians in hospital service areas	Physician-population ratio	Physicians per 1,000 population
Areas with highest rates	171,750	123	1:1,396	.7
Areas with lowest rates	403,118	372	1:1,084	.9

*Physician supply in the areas of highest and lowest utilization is based upon the number of active physicians in the hospital service areas within which are located the 50 areas of highest and the 50 areas of lowest utilization. Ratios and rates are computed using the total population in the corresponding hospital service areas.

the areas with high hospitalization rates have relatively fewer physicians. Probably what is operative here is a pressure on the doctor's time and it may be that admission to hospital is influenced by his need to serve a larger number of people. This time factor may even be aggravated by greater distances to travel, as would be reflected in the earlier finding of the lower population density in high hospitalization areas. It might be concluded that as the ratio of doctors to patients increases the need for hospital beds may be expected to decrease and our long-term needs would be met better by building more medical schools than more hospitals.

There seems to be a difference in the type of physicians practicing in the high and low areas. Table X would seem to indicate that there is a greater concentration of younger doctors in the areas of high hospital use. Thus 56 per cent of the doctors in these areas are under forty years of age as compared with 43 per cent in the low areas. One might speculate as to whether the new medical graduate was attracted to a community with more hospital beds available or that perhaps the older doctor moved from areas of low population density to areas of higher density. One might also ask whether the younger doctor admits his patient to hospital more frequently than his older colleague and for what reasons. This is another field for further study.

TABLE X
AGE DISTRIBUTION OF PHYSICIANS IN AREAS WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952

Age in years	Number of physicians		Per cent		Cumulative per cent	
	Areas with highest rates	Areas with lowest rates	Areas with highest rates	Areas with lowest rates	Areas with highest rates	Areas with lowest rates
Total	123	372	100.0	100.0		
0-29	18	36	14.6	9.7	14.6	9.7
30-34	33	67	26.8	18.0	41.4	27.7
35-39	18	58	14.6	15.6	56.0	43.3
40-44	11	48	8.9	12.9	64.9	56.2
45-49	7	32	5.7	8.6	70.6	64.8
50-54	5	28	4.1	7.5	74.7	72.3
55-59	7	24	5.7	6.5	80.4	78.8
60+	20	68	16.3	18.3	96.7	97.1
Unstated	4	11	3.3	2.9	100.0	100.0

Health Status

It is very difficult to obtain data on the health status of the population from available sources in terms of the small areas investigated in this study. The crude death rate, for example, is not available although we hope to obtain this in a further follow-up to this study. Some rather crude data on tuberculosis mortality suggests that there is no apparent relationship between this index and hospital utilization.

It has long been pointed out that infant mortality is a fairly useful reflection of over-all health status and hygienic conditions. Table XI shows that an appreciably higher infant mortality is observed in the areas of low hospital utilization. We are not certain of the meaning of this. It may be a result of low hospitalization itself or it may be a feature of the general living conditions in the area which in turn cause the low hospitalization. These figures should be interpreted with a considerable amount of discretion. The number of births

in hospital in the areas of high and low utilization are related to beneficiaries of the Plan. However the number of infant deaths has been obtained from vital registrations and includes a certain number of non-beneficiaries. An estimate of the correction required has the effect of reducing the infant mortality rate of Hospital Plan beneficiaries in the areas of high utilization slightly. Nevertheless there are significant differences in the infant mortality rates of the two areas and at the moment we do not know the significance of this. Further study of this point is also indicated.

TABLE XI
INFANT MORTALITY IN AREAS WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952

Area	Number of live births	Infant deaths	
		Number	Rate per 1,000 live births
Areas with highest rates	1,661	33	19.9
Areas with lowest rates	3,147	113	35.9

HOSPITALIZATION EXPERIENCE

General Volume

As mentioned earlier, the over-all hospital case rate in rural areas of Saskatchewan is considerably higher than in the cities. In the present study the selection of the 50 areas of highest and 50 areas of lowest utilization resulted in the complete absence of any communities of over 5,000 population in the high areas and the absence of any towns of 1,000 to 5,000 population in the low areas. In Table XII this will be noted. It may be further noted that within rural areas alone there is a ratio of 2: 1 in hospital cases between the high and low hospitalization areas. Rurality or urbanity as such, therefore, cannot explain the differences in hospital case rates.

Analysis of hospital cases by age and sex composition indicates that the differential in experience between high and low hospitalization areas cannot be attributed to use by any particular age group. Marked differentials occur

TABLE XII
URBAN AND RURAL DISTRIBUTION OF HOSPITAL CASES IN AREAS WITH
HIGHEST AND LOWEST HOSPITALIZATION RATES, 1952

Type of Community	50 Areas with highest rates	50 Areas with lowest rates
	Number of discharged cases	
All types of community	21,556	20,697
Cities (over 5,000 population)	—	7,677
Towns (1,000-5,000 population)	2,306	—
Rural (including towns and villages under 1,000)	19,250	13,020
	Crude rate per 1,000 persons	
All types of community	311	148
Cities (over 5,000 population)	—	145
Towns (1,000-5,000 population)	324	—
Rural (including towns and villages under 1,000)	309	150

at all age groups in the study area. It has been shown that the age and sex composition of the population was not significantly different (Table V). It may be noted in Table XIII, however, that the differentials are somewhat greater in the childhood years under 14 and in the years after 65. On the other hand, in the years 15-64 the differentials between the high and low areas are the least. It has been amply demonstrated that the curve of hospital utilization is higher at both ends of the life span and it might be speculated whether the demands of occupation during the wage-earning years are such as to reduce the tendency to hospitalization even in the areas of high utilization.

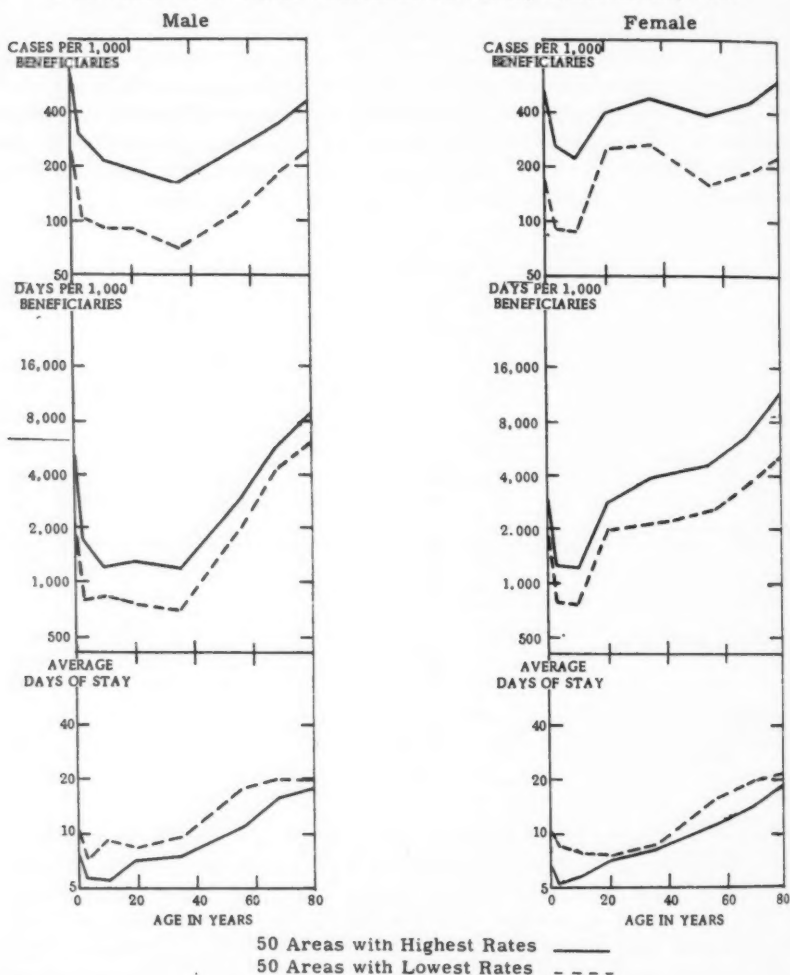
TABLE XIII
AGE AND SEX DISTRIBUTION OF HOSPITAL CASES IN AREAS WITH
HIGHEST AND LOWEST HOSPITALIZATION RATES, 1952

Item	All ages	Age in years							
		0-1	1-4	5-14	15-24	25-44	45-64	65-69	70+
		Number of discharged hospital cases							
50 Areas with highest rates									
Both sexes	21,556	884	1,878	3,139	3,031	5,826	3,700	1,022	2,076
Male	9,099	489	1,038	1,605	1,002	1,587	1,648	572	1,158
Female	12,457	395	840	1,534	2,029	4,239	2,052	450	918
50 Areas with lowest rates									
Both sexes	20,697	618	1,281	2,247	3,664	6,581	3,527	904	1,875
Male	7,823	348	728	1,189	947	1,374	1,612	502	1,123
Female	12,874	270	553	1,058	2,717	5,207	1,915	402	752
Cases per 1,000 persons									
50 Areas with highest rates									
Both sexes	311	514	273	226	294	317	306	382	611
Male	247	569	286	224	191	167	246	341	564
Female	382	459	258	227	400	477	380	450	682
50 Areas with lowest rates									
Both sexes	148	176	99	90	171	170	136	176	269
Male	109	198	108	92	90	72	116	170	287
Female	190	155	89	88	249	264	159	183	245

When one studies the average duration of stay of cases in the study areas, a striking difference is found. The areas of high hospitalization have a lower duration of stay per case at all age levels. The differential is least among females aged 15-44 years where obstetrical cases, with a rather fixed custom of hospital stay, tend to predominate. It also seems evident that the so-called healthiest age groups in the high utilization areas go to hospital at approximately the same rate as the unhealthiest groups in the other areas. This general finding suggests that in the areas of high utilization there tends to be more frequent admission of minor cases which require shorter hospital stay. Perhaps this could also be expressed by suggesting that in the areas of low utilization, only the more serious cases tend to go to hospital. These general findings in relation to age and sex are illustrated in Fig. 2.

Analysis by size of family suggests that there is no striking utilization differential between high and low areas in any family size group. In all sizes of family the admission rate in the high areas is over twice that found in the low areas. Again, it is noted that the average days stay is generally longer in the areas of low utilization. This is shown in Table XIV.

Fig. 2. HOSPITAL CASES AND DAYS PER 1,000 AND AVERAGE LENGTH OF STAY IN AREAS WITH HIGHEST AND LOWEST HOSPITALIZATION RATES, SASKATCHEWAN, 1952.



A surprisingly high percentage of Saskatchewan people secure hospitalization more than once in any year. In Table XV these frequencies of hospitalization are indicated. It will be noted that in the areas of low hospital use, single admissions per year constitute 84.2 per cent of all hospital patients, whereas in the high areas they constitute only 74.4 per cent. However, when the experience is reduced to a rate basis the comparable picture between the high and low areas becomes clearer. When the number of people who use the hospital one, two or more times per year is set out on the basis of 1,000 covered population, it soon becomes apparent that those persons who have two or more admissions per year contribute heavily to the high rates in the high hospitalization areas.

TABLE XIV
HOSPITAL CARE BY SIZE OF FAMILY IN AREAS WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952

Number of persons in family unit*	Cases per 1,000 beneficiaries		Average days of stay		Days per 1,000 beneficiaries	
	50 Areas with highest rates	50 Areas with lowest rates	50 Areas with highest rates	50 Areas with lowest rates	50 Areas with highest rates	50 Areas with lowest rates
Total	311	148	9.3	11.8	2,902	1,741
1	295	139	14.1	18.2	4,159	2,537
2	413	203	11.7	13.3	4,830	2,710
3	326	162	7.9	8.9	2,591	1,431
4	308	139	7.0	8.7	2,151	1,212
5	274	124	6.8	8.6	1,849	1,060
6	284	119	6.8	9.3	1,932	1,098
7	260	115	7.2	9.4	1,881	1,079
8	265	99	6.5	9.6	1,718	948
9	245	118	8.5	11.9	2,087	1,404
10+	227	111	7.9	10.4	1,803	1,152

*The term "family unit" includes all persons in a family covered by the maximum hospitalization tax of \$30, except that an unknown number of students between 18 and 21 years have been listed as single adults because of the basis on which tax collections are reported.

A detailed study of these "repeaters" is required and we are planning to look at them with respect to disease category, age, social background and other variables.

The rural-urban distribution of persons who had two or more admissions in the study year has been studied. The results are shown in Fig. 3. Within the high or low hospitalization areas there is a greater frequency of multiple admissions among the rural dwellers than among the urban dwellers. In the light of the large proportionate differences which were evident in Table XV, we feel that this rural predominance may be of some significance by itself, but is certainly only a contributory factor.

Fig. 3. PROPORTION OF PATIENTS WITH TWO OR MORE HOSPITAL ADMISSIONS IN AREAS WITH HIGHEST AND LOWEST HOSPITALIZATION RATES, SASKATCHEWAN, 1952.

PER CENT
OF PATIENTS

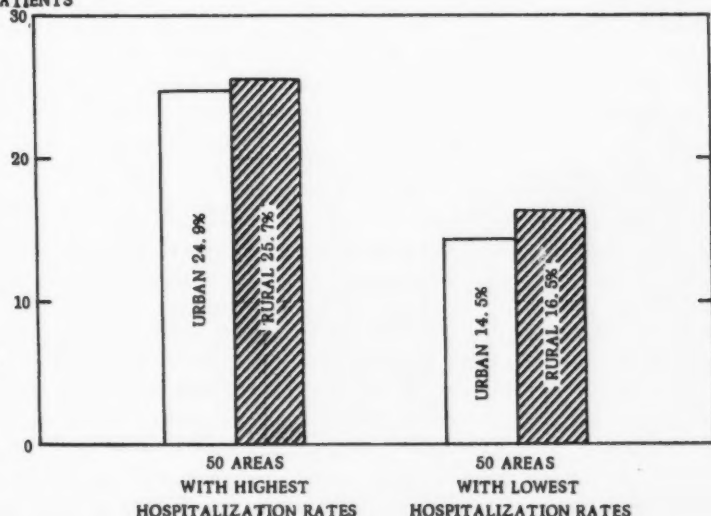


TABLE XV
PERSONS HOSPITALIZED ACCORDING TO FREQUENCY OF HOSPITALIZATION
IN AREAS WITH HIGHEST AND LOWEST HOSPITALIZATION RATES, 1952

Item	Number of times discharged from hospital					
	Total	1	2	3	4	5+
Number of persons						
Areas with highest rates	15,596	11,601	2,758	817	257	163
Areas with lowest rates	17,186	14,473	2,166	391	105	51
Patients per 1,000 covered population						
Areas with highest rates	224.8	167.2	39.8	11.8	3.7	2.3
Areas with lowest rates	122.9	103.5	15.5	2.8	.7	.4
Percentage distribution						
Areas with highest rates	100.0	74.4	17.7	5.2	1.7	1.0
Areas with lowest rates	100.0	84.2	12.6	2.3	.6	.3

Diagnostic Categories

Analyzing the experience in the high and low hospitalization areas by diagnosis, it is found that for virtually all diagnostic categories the admission rate is greater in the high areas than in the low areas. About the only exception to this is in disease category (C6) "Other infective diseases commonly arising in the intestinal tract." The significance of this is not clear.

As a rule the case fatality rate is a good reflection of the seriousness of hospital cases. It will be noted in Table XVI that for all diagnoses the case fatality rate in the low areas is almost twice as high as in the high areas. It seems obvious that in the low areas the hospitals tend to be used as a resource for more serious cases of illness.

The most frequent cause of admission in both high and low utilization areas is shown in category (C43) "Deliveries, complications of pregnancy, childbirth and the puerperium." For this category, however, the ratio between the high and low areas is about 4:3; this is much less than the ratio for all other diagnoses. An examination of the actual number of deliveries in relation to all admissions under the categorical diagnosis indicates that in the high areas 58 per cent of the admissions resulted in delivery while in the low areas 67 per cent of the admissions were for delivery.

Differentials between the high and low areas are particularly striking for certain conditions. In such conditions as influenza (C30), pneumonia (C31), bronchitis (C32) and other respiratory diseases there are differentials of 4:1 or 5:1 or 6:1 between the high and low areas. This may be a striking indication of the tendency to admit patients to hospital in one area who in another area would be treated at home. For tonsillitis, including tonsillectomy (C29), on the other hand, the ratio between the high and low areas is only about 2.5:1.

Accidents (C50) are the second highest cause for admission in both high and low utilization areas, but in the high areas admissions are more than twice as frequent. In the low areas the case fatality rate for accidents is 2.5 times greater than in the areas of high use. This figure needs some adjustment to

TABLE XVI
CAUSES OF HOSPITAL ADMISSION IN AREAS WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952

List Nos.	Primary diagnosis	50 Areas with highest rates			50 Areas with lowest rates		
		No. of discharged cases	Rate per 1,000 persons	Fatality rate per 100 cases	No. of discharged cases	Rate per 1,000 persons	Fatality rate per 100 cases
	All causes	21,556	311	1.46	20,697	148	2.89
C 1	Tuberculosis of respiratory system	5	0.07	—	4	0.03	—
C 2	Tuberculosis, other forms	3	0.04	—	5	0.04	—
C 3	Syphilis and its sequelae	15	0.22	—	21	0.15	9.52
C 4	Gonococcal infection	—	—	—	2	0.01	—
C 5	Dysentery, all forms	16	0.23	—	7	0.05	14.29
C 6	Other infective diseases commonly arising in intestinal tract	24	0.35	—	153	1.09	—
C 7	Certain diseases common among children (Scarlet Fever, Diphtheria, Whooping Cough, Measles, Mumps)	148	2.13	—	100	0.72	1.00
C 8	Typhus and other rickettsial diseases	1	0.01	—	—	—	—
C 9	Malaria	7	—	—	1	0.01	—
C10	Diseases due to helminths	7	0.10	—	7	0.05	—
C11	All other diseases classified as infective and parasitic	348	5.01	1.44	463	3.31	6.05
C12	Malignant Neoplasms, including Neoplasms of lymphatic and haematopoietic tissues	349	5.03	22.06	544	3.89	26.29
C13	Benign Neoplasms and Neoplasms of unspecified nature	346	4.99	1.45	580	4.15	0.86
C14	Allergic disorders	317	4.57	0.95	207	1.48	2.42
C15	Diseases of thyroid gland	112	1.61	—	142	1.02	—
C16	Diabetes mellitus	232	3.34	3.02	245	1.75	4.08
C17	Avitaminosis and other deficiency states	14	0.20	—	13	0.09	7.69
C18	Anaemias	91	1.31	—	77	0.55	—
C19	Psychoneuroses and psychoses	243	3.50	—	225	1.61	—
C20	Vascular lesions affecting central nervous system	136	1.96	27.94	188	1.34	33.51
C21	Diseases of eye	180	2.59	0.56	203	1.45	—
C22	Diseases of ear and mastoid process	513	7.39	0.39	167	1.19	0.59
C23	Rheumatic fever	141	2.03	—	120	0.86	1.67
C24	Chronic rheumatic heart disease	47	0.68	10.64	45	0.32	22.22
C25	Arteriosclerotic and degenerative heart disease	473	6.82	13.53	507	3.63	22.68
C26	Hypertensive disease	253	3.65	5.93	215	1.54	11.16
C27	Diseases of veins	350	5.04	0.57	337	2.41	2.08
C28	Acute nasopharyngitis (common cold)	43	0.62	—	33	0.24	—
C29	Acute pharyngitis and tonsillitis, and hypertrophy of tonsils and adenoids	1,819	26.21	0.05	1,397	9.99	—
C30	Influenza	860	12.39	—	297	2.12	0.34
C31	Pneumonia	1,132	16.31	1.06	699	5.00	2.86
C32	Bronchitis	853	12.29	0.23	275	1.97	—
C33	Silicosis and occupational pulmonary fibrosis	—	—	—	—	—	—
C34	All other respiratory diseases	699	10.07	0.14	456	3.26	0.22
C35	Diseases of Stomach and duodenum, except cancer	453	6.53	0.44	342	2.45	1.75
C36	Appendicitis	610	8.79	—	913	6.53	0.33
C37	Hernia of abdominal cavity	252	3.63	1.19	368	2.63	0.54
C38	Diarrhoea and enteritis	508	7.32	0.20	337	2.41	1.48
C39	Diseases of gallbladder and bile ducts	473	6.82	0.21	386	2.76	1.04
C40	Other diseases of digestive system	671	9.67	0.89	620	4.43	2.58
C41	Nephritis and nephrosis	98	1.41	6.12	65	0.46	7.69
C42	Diseases of genital organs	842	12.13	—	909	6.50	1.21
C43	Deliveries, complications of pregnancy, childbirth and the puerperium	2,874	41.42	0.03	4,686	33.51	0.09
C44	Boil, abscess, cellulitis and other skin infections	291	4.19	—	148	1.06	—
C45	Other diseases of skin	223	3.21	0.90	181	1.29	—
C46	Arthritis and rheumatism, except rheumatic fever	530	7.64	0.38	328	2.35	1.22
C47	Diseases of bones and other organs of movement	217	3.13	—	312	2.23	—
C48	Congenital malformations and diseases peculiar to early infancy	139	2.00	2.16	153	1.09	3.92
C49	Other specified and ill-defined diseases	1,784	25.71	1.91	1,592	11.38	3.77
C50	Accidents, poisonings, and violence	1,821	26.24	0.77	1,615	11.55	2.04
	Not stated	—	—	—	7	0.05	—

TABLE XVII
HOSPITAL DAYS OF CARE BY DIAGNOSIS IN AREAS WITH HIGHEST
AND LOWEST HOSPITALIZATION RATES, 1952

List Nos.	Primary diagnosis	50 Areas with highest rates			50 Areas with lowest rates		
		Total patient days for discharged cases	Rates per 1,000 persons	Average days of stay	Total patient days for discharged cases	Rates per 1,000 persons	Average days of stay
	Total	201,407	2,902.45	9.34	243,422	1,740.78	11.76
C 1	Tuberculosis of respiratory system	409	5.89	81.80	36	0.26	9.00
C 2	Tuberculosis, other forms	58	0.84	19.33	122	0.87	24.40
C 3	Syphilis and its sequelae	272	3.92	18.13	658	4.71	31.33
C 4	Gonococcal infection	—	—	—	35	0.25	17.50
C 5	Dysentery, all forms	89	1.28	5.56	65	0.46	9.29
C 6	Other infective diseases commonly arising in intestinal tract	—	—	—	—	—	—
C 7	Certain diseases common among children (Scarlet Fever, Diphtheria, Whooping Cough, Measles, Mumps)	132	1.90	5.50	142	1.02	15.78
C 8	Typhus and other Rickettsial diseases	1,173	16.90	7.93	2,765	19.77	11.33
C 9	Malaria	7	0.10	7.00	—	—	—
C 10	Diseases due to helminths	29	0.42	4.14	39	0.28	5.57
C 11	All other diseases classified as infective and parasitic	3,955	57.00	11.36	8,248	58.98	17.81
C 12	Malignant neoplasms, including neoplasms of lymphatic and haematopoietic tissues	13,241	190.81	37.94	17,502	125.16	32.17
C 13	Benign neoplasms and neoplasms of unspecified nature	3,895	56.13	11.26	6,651	47.56	11.47
C 14	Allergic disorders	3,324	47.90	10.49	2,260	16.16	10.92
C 15	Diseases of thyroid gland	1,623	23.39	14.49	2,390	17.09	16.83
C 16	Diabetes mellitus	3,972	57.24	17.12	4,419	31.60	18.04
C 17	Avitaminosis and other deficiency states	363	5.23	25.93	260	1.86	20.00
C 18	Anaemias	1,081	15.58	11.88	1,478	10.57	19.19
C 19	Psychoneurosis and psychosis	2,833	40.83	11.66	4,075	29.14	18.11
C 20	Vascular lesions affecting central nervous system	3,627	52.27	26.67	5,369	38.40	28.56
C 21	Diseases of eye	1,742	25.10	9.68	1,891	13.52	9.32
C 22	Diseases of ear and mastoid process	3,025	43.59	5.90	1,065	7.62	6.38
C 23	Rheumatic fever	2,762	39.80	19.59	3,073	21.97	25.61
C 24	Chronic rheumatic heart disease	473	6.82	10.06	1,686	12.06	37.47
C 25	Arteriosclerotic and degenerative heart disease	8,189	118.01	17.31	14,657	104.82	28.91
C 26	Hypertensive disease	4,132	59.55	16.33	3,606	25.79	16.77
C 27	Diseases of veins	3,780	54.47	10.80	4,638	33.17	13.76
C 28	Acute nasopharyngitis (common cold)	153	2.20	3.56	191	1.36	5.79
C 29	Acute pharyngitis and tonsillitis, and hypertrophy of tonsils and adenoids	6,086	87.70	3.35	3,627	25.94	2.60
C 30	Influenza	4,493	64.75	5.22	1,713	12.25	5.77
C 31	Pneumonia	9,421	135.76	8.32	7,478	53.48	10.70
C 32	Bronchitis	5,599	80.69	6.56	2,216	15.85	8.06
C 33	Silicosis and occupational pulmonary fibrosis	—	—	—	—	—	—
C 34	All other respiratory diseases	4,619	66.56	6.61	3,728	26.66	8.18
C 35	Diseases of stomach and duodenum, except cancer	3,921	56.51	8.66	4,917	35.16	14.38
C 36	Appendicitis	5,357	77.20	8.73	8,400	60.07	9.20
C 37	Hernia of abdominal cavity	3,413	49.18	13.54	5,695	40.73	15.48
C 38	Diarrhoea and enteritis	2,628	37.87	5.17	3,085	22.06	9.15
C 39	Diseases of gallbladder and bile ducts	4,842	69.78	10.24	5,308	37.96	13.75
C 40	Other diseases of digestive system	4,420	63.70	6.59	5,628	40.25	9.08
C 41	Nephritis and nephrosis	1,258	18.13	12.84	1,368	9.78	21.05
C 42	Diseases of genital organs	8,105	116.80	9.63	11,175	79.92	12.29
C 43	Deliveries, complication of pregnancy, childbirth and the puerperium	21,749	313.42	7.57	33,152	237.08	7.07
C 44	Boil, abscess, cellulitis and other skin infections	1,598	23.03	5.49	866	6.19	5.85
C 45	Other diseases of skin	2,333	33.62	10.46	2,718	19.44	15.02
C 46	Arthritis and rheumatism, except rheumatic fever	9,621	138.65	18.15	7,895	56.46	24.07
C 47	Diseases of bones and other organs of movement	2,716	39.14	12.52	3,581	25.61	11.48
C 48	Congenital malformations and diseases peculiar to early infancy	2,022	29.14	14.55	2,140	15.30	13.99
C 49	Other specified and ill-defined diseases	18,554	267.38	10.40	22,269	159.25	13.99
C 50	Accidents, poisonings, and violence	14,313	206.26	7.86	19,056	136.27	11.80
	Not stated	—	—	—	67	0.48	9.57

take account of the effect of Workmen's Compensation coverage which is not known to us at this time.

A relatively high cause for admission in both high and low areas is appendicitis (C36). The differential between the two areas is not very great—it being only about 33 per cent higher in the high hospitalization areas. The differentials for appendicitis between municipalities in Saskatchewan, as was pointed out by Myers previously, is often much greater than 100 per cent.

For conditions of the ear and mastoid (C22) the ratio between the high and low areas is 6:1. For the childhood exanthemata (C7) the ratio is about 3:1. For arthritis and rheumatism (C46) it is about 3:1.

It seems obvious that the differential between high and low areas is greater for medical than for surgical diagnoses. It would seem relevant that hospitalization, as against care at home, is more elective for medical than for surgical

TABLE XVIII

SURGICAL OPERATIONS IN AREAS WITH HIGHEST AND LOWEST HOSPITALIZATION RATES, 1952

Operation	50 Areas with highest hospitalization rates			50 Areas with lowest hospitalization rates		
	Primary surgical operations	Rate per 1,000 persons		Primary surgical operations	Rate per 1,000 persons	
		Crude	Adjusted		Crude	Adjusted
All operations	5,059	72.9	71.8	7,168	51.3	51.0
Tonsillectomy, adenoidectomy	1,106	15.9	15.2	1,264	9.0	9.2
Appendectomy, drainage appendiceal abscess	500	7.2	7.1	823	5.9	6.0
Transfusion of blood, plasma or serum	104	1.5	1.5	244	1.7	1.7
Dilatation of cervix, dilatation and curettage	178	2.6	2.7	260	1.9	1.8
Extraction of teeth	289	4.2	4.2	274	2.0	1.9
Cystoscopy	166	2.4	2.3	293	2.1	2.1
Herniorrhaphy, hernioplasty herniotomy, repair of hernia, reduction strangulated hernia	219	3.2	3.0	354	2.5	2.5
Reduction of fracture—closed and open includes plating bone, grafting, pinning, wiring, elevation of simple fracture	133	1.9	1.8	250	1.8	1.8
Cholecystectomy—biopsy biliary tract	104	1.5	1.5	176	1.3	1.2
Suture-wound, injury, debridement, closure of sinus or fistula N.O.S.	132	1.9	1.9	98	0.7	0.7
Haemorrhoidectomy, coagulations of haemorrhoids	106	1.5	1.6	113	0.8	0.8
Local excision of skin area—naevus, wart, lipoma, skin tumor, scar tissue, biopsy of skin, contracture cicatrix	96	1.4	1.4	123	0.9	0.9
Incision and drainage abscess, carbuncle, haematoma, etc.	130	1.9	1.9	73	0.5	0.5
Phlebectomy—ligation of varicosity, simple or with removal of vein	70	1.0	1.0	116	0.8	0.8
Hysterectomy—radical hysterectomy—panhysterectomy, removal of uterus, subtotal hysterectomy	74	1.1	1.1	128	0.9	0.9
Prostatectomy—transurethral	53	0.8	0.7	92	0.6	0.7
Circumcision	54	0.8	0.8	56	0.4	0.4
Hysteropexy, Manchester operation, ventrofixation, ventrosuspension	26	0.4	0.4	46	0.3	0.3
Laparotomy—exploratory	74	1.1	1.1	108	0.8	0.8
Oophorectomy—complete or partial, removal of ovaries, removal of ovarian cyst	40	0.6	0.6	60	0.4	0.4
Cystocele, rectocele—repair of (resuture of cystocele or rectocele)	59	0.9	0.8	92	0.7	0.6
Thyroidectomy—removal of adenoma	7	0.1	0.1	76	0.5	0.5
Local excision of lesion, biopsy, cyst, tumor	39	0.6	0.6	79	0.6	0.5
Amputation—any site on extremities	38	0.5	0.5	46	0.3	0.3
Proctoscopy—sigmoidoscopy	54	0.8	0.8	50	0.4	0.4
Encephalography, air encephalogram	34	0.5	0.5	59	0.4	0.4
Caesarean section	29	0.4	0.5	25	0.2	0.2
Cauterization of cervix, polyp conization of cervix	24	0.3	0.4	31	0.2	0.2
Lumbar puncture, myelogram	38	0.5	0.5	49	0.4	0.4
All others	1,083	15.6	15.3	1,710	12.2	12.1

conditions and may thus explain the differences in use of the hospital for treatment in the high and low areas.

Turning to findings on the length of stay by diagnosis, in Table XVII, it is found that the greater length of stay is consistent for virtually all diagnoses in the low hospitalization areas. This greater duration of stay in the areas of low use is particularly striking for accidents (C50), arthritis and rheumatism (C46), diseases of the stomach and duodenum (except cancer) (C35) anaemias (C18) and arteriosclerotic heart disease (C25).

Exceptions may be noted for cancer (C12), tonsillitis (C29) and maternity cases (C43). Perhaps in these conditions there are prevailing patterns of medical practice and custom which influence the length of stay.

In Table XVIII data are presented for surgical operations. As one might by now suspect, the surgical rate is 42 per cent higher in the high hospitalization areas than in the low. The differential is much less striking, however, than for total admissions. In the areas of high use, 23 per cent of the total admissions resulted in primary surgical operations, while in the areas of low use the percentage was 34.

For such procedures as tonsillectomy the differential is much greater, being 66 per cent higher in the 50 areas of high use than in the low. For certain, usually minor operations the rate in the high areas is twice or three times higher; these are extraction of teeth, suturing of wounds, haemorrhoidectomy and incision of abscesses. Obviously there are operative here the various factors which lead people to seek more hospitalization in some areas than in others.

It may be of interest to examine the prevalence of long-stay hospital cases among persons from the study areas. For purposes of discussion we have

TABLE XIX
LONG-STAY CASES (30 DAYS OR MORE) AT NOVEMBER 30, 1952, IN AREAS
WITH HIGHEST AND LOWEST HOSPITALIZATION RATES IN 1952

Item	50 Areas with highest rates	50 Areas with lowest rates
Number of long-stay cases at November 30		
All cases	86	163
Acutely ill and convalescent	32	68
Chronically ill	54	95
Long-stay cases per 1,000 beneficiaries at November 30		
All cases	1.24	1.17
Acutely ill and convalescent	.46	.49
Chronically ill	.78	.68
Average days of stay up to November 30		
All cases	255.76	174.44
Acutely ill and convalescent	66.03	73.09
Chronically ill	368.19	246.98
Accumulated days of stay up to November 30		
All cases	21,995	28,433
Acutely ill and convalescent	2,113	4,970
Chronically ill	19,882	23,463

defined long-stay cases as those who are in hospital 30 days or more. At any given time, it appears that the prevalence of these long-stay cases is about the same for both groups of areas. Table XIX details the situation existing at November 30, 1952. It will be noted that the average duration of stay of these cases is considerably greater in the high hospitalization areas. This is the opposite picture to the duration of stay for all cases.

If the long-stay cases are examined by their age level and by sex, it is found that the prevalence of such cases under age 70 is slightly greater in the areas of low hospital use. After age 70, however, the prevalence is twice as high in the high hospitalization areas. This is shown in Table XX. Under age 70 a long hospital stay may reflect mainly the severity of illness, while after 70 it tends to reflect a lack of alternate housing facilities for the chronically ill.

TABLE XX

AGE AND SEX DISTRIBUTION OF LONG-STAY CASES AT NOVEMBER 30, 1952, IN AREAS WITH HIGHEST AND LOWEST HOSPITALIZATION RATES IN 1952

Item	All cases	Age in years						
		0-4	5-14	15-24	25-44	45-64	65-69	70+
Number of cases								
Both sexes								
50 Areas with highest rates	86	8	7	4	11	10	7	39
50 Areas with lowest rates	163	13	20	10	24	45	14	37
Males								
50 Areas with highest rates	56	6	7	3	5	6	5	24
50 Areas with lowest rates	73	4	12	2	7	23	7	18
Females								
50 Areas with highest rates	30	2	—	1	6	4	2	15
50 Areas with lowest rates	90	9	8	8	17	22	7	19
Cases per 1,000 beneficiaries								
Both sexes								
50 Areas with highest rates	1.24	.93	.50	.39	.60	.83	2.61	11.47
50 Areas with lowest rates	1.17	.79	.80	.47	.62	1.74	2.72	5.30
Males								
50 Areas with highest rates	1.52	1.34	.98	.57	.53	.90	2.98	11.68
50 Areas with lowest rates	1.02	.47	.93	.19	.37	1.66	2.38	4.60
Females								
50 Areas with highest rates	.92	.49	—	.20	.68	.74	2.00	11.14
50 Areas with lowest rates	1.32	1.13	.66	.73	.86	1.83	3.18	6.19

SUMMARY AND CONCLUSIONS

On the basis of this study we would suggest that it is possible to define a profile of the demographic characteristics and social environment of persons in areas where a high rate of hospitalization is experienced as against persons in areas with low hospitalization experience. Briefly, in the high hospitalization areas there tends to be a more rural population, at low density and including more large families. The value of their farm land is less per acre but, so far as we can tell, their per capita income is about the same as persons in low hospitalization areas. They tend to live at greater distances from large cities. They are served by a greater supply of hospital beds proportional to population but a lesser supply of physicians. The physicians tend to be of lower age levels.

Patients tend to be admitted to hospital for conditions of lesser seriousness and proportionately more of a medical than a surgical nature. There also tends to be a greater proportion of persons with two or more admissions to hospital per year.

In a general way, the social and professional conditions in areas of low hospitalization are the opposite. Certainly it can be pointed out that province-wide averages for hospitalization, even in a relatively homogeneous province like Saskatchewan, are deceptive.

One of the more significant findings is that the number of persons who are admitted to hospital two or more times in a given year is much greater in areas of high utilization than in areas of low use. Further study of this phenomenon is indicated.

It is obvious that the factors found in this study are associated with conditions of universal hospital insurance in which economic barriers are removed. This is particularly striking in view of the fact that the findings in Saskatchewan are precisely the opposite from those found in areas where hospital insurance on a universal basis does not exist. In the United States, for example, most areas that are described here as high hospitalization areas are usually found to have the lowest hospitalization experience. Anderson, in his recently published study for the Health Information Foundation, points out that the hospital utilization rate for rural areas is considerably higher than urban areas when the residents are insured, but is low when they are not insured. This parallels our own findings. In other words, the removal of cash barriers has reversed the apparent picture of hospital bed needs.

High utilization is certainly a product of a number of social, geographic and professional conditions which may be beyond the control of individual families living under those conditions. Similarly, those conditions may be beyond the control of the physician to a considerable extent. We do not think we can assume from the facts at our command that the reasons for the wide variations in hospital use are explainable by any single factor. It seems quite illogical to argue that the causes of the high use of hospitals in some areas can be explained by any one of the reasons commonly put forward. In the past many such reasons have been given and have varied from the suggestion that people are "trying to get their money's worth" regardless of personal inconvenience, to an indictment of the doctor for using the hospital for his own convenience or to a suggestion that there may be wide variations in the sickness rates in various areas. Our conclusion is that many factors, some of them probably as yet unknown, are all involved.

If, for financial reasons, a reduction in hospitalization in a province were to be desired, clues on what might be needed may be found in this study. It would seem, for example, that an increase in the supply of available physicians and an improvement of road conditions, reducing rural isolation, might have the effect of reducing hospital utilization.

Whether the families having high hospitalization rates are better off than those with low use cannot be concluded from this study. We cannot be sure, moreover, whether the building of hospital beds is a cause of high utilization

or a result of demands for hospitalization caused by other social and professional factors, some of which are reviewed here. It is possible that persons in areas of high utilization are receiving better medical care, or it may be that they are receiving unnecessary care and that society is providing hospitals where good housing and better out-patient services would be more effective health promotion. In any event, further studies are needed to determine the supply of hospital beds necessary to meet objective health needs under given social conditions and in the absence of economic barriers. Our present criteria for estimating bed needs should be critically examined in the light of current experience and trends of medical practice as well. And, finally, we should examine our needs in terms of our collective ability to pay for them. Along with this continuing evaluation, greater efforts are needed to determine the impact of hospitalization on community health.

**TWENTY-THIRD
ANNUAL CHRISTMAS MEETING**

of the

LABORATORY SECTION
Canadian Public Health Association

**ROYAL YORK HOTEL
TORONTO**

DECEMBER 12 and 13, 1955

Further information can be obtained by writing to Dr. F. O. Wishart,
Secretary, Laboratory Section, Canadian Public Health Association, 150
College Street, Toronto 5, Ontario

Suburbanization*

PROFESSOR ANTHONY ADAMSON
School of Architecture, University of Toronto

I HAVE been asked to make some comment on Suburbanization. This activity is well known to almost every Health Unit official and it is a particularly active activity in the Toronto area. Like all human community activities it has many facets: physical, social, economic, and political, and it cannot be canvassed adequately in a short time.

Suburbanization is a low density spread of population out from an urban centre. Before the car, suburbanization was by accretion—a natural addition of people, buildings and pipes to a city. Since the arrival of universal auto-mobility in North America suburbanization now takes place by explosion. Every acre within 50 minutes car drive of a metropolis the size of Toronto has had its value affected by the potential of suburbanization. Big developers of land, 300 acres and up, are having to go further and further afield to get what they want, and the roads, the wires, the pipes, the sanitary inspectors, the assessors, the firemen, the political institutions, the methods of taxation and the social customs are being stretched or spread or broken to keep up with them.

Suburbanization is not two men leaning over a white barred fence discussing some new and mutually absorbing problem like a sump pump. Suburbanization is a colossal and complex movement of people and development of land and resources which, in its size and force, is tending to affect Provincial economies and political systems.

Why do people live in suburbs? It has seemed to me that there are four reasons.

The first is the response of an energetic but low income urban wage earner who wishes to have a place of his own, and live more freely in a way which he cannot afford to do in town. This man must buy cheap and build cheap. Many have the skill, and the proper type of wife, to build their own place with their own hands, to live in a basement until they have the money to put up an insul-brick house on top. This can only be done in areas where controls of land use and of building construction are not severe, in other words only in the semi-rural townships. Here the cutting up of land along a concession road "ribbon" in lots sometimes 60' X 600' does not seem out of place.

The effect of this primitive form of suburbanization is disastrous economically upon the municipality in which it occurs, and it seldom leads to a happy life for those who undertake it. All of you know the concession lines built up with this type of house. Public Health Officials know the problems which too often arise inside those houses. Living is not cheap away out there. Wives are marooned. Living is not only fresh air and space, living is community life, and recreation, and too often this kind of family is not socially acceptable to local land owners.

The eventual integration of these semi-rural semi-slums into a true suburb is extremely difficult and expensive, and the land on which they develop is

*Address given at a Regional Public Health Conference, for Public Health personnel in Ontario, Toronto, January 27, 1955.

often jumped by developers and a confused pattern of residence, chicken house, weed patch, block plant, and filling station materializes.

The second typical reason for moving out to the fringe is to find some fair semblance to country life. This is a secondary, if not a primary motive for all who move. The rich breed race horses, the ordinary man gets an apple tree and pink cheeked children. Trouble for this man soon arises in a fast growing area when others start to move out too and he finds he is not in the country after all despite his two acres. He opposes further development, he won't sign local improvement petitions, he confuses zoning by-laws by his entreaties, he complains about drainage run-off, he has not enough land to divide and move again.

A third reason for going suburban is that it is only in the suburbs that families can get a new house and lot and all the convenience and prestige and excitement that go with them. Suburban living is usually regarded as "The Good Life." It has its draw-backs but its advantages at first at least outweigh them. So it should, because the man who can afford to buy a new house is a rare person. In my county which is possibly the wealthiest county in Ontario, of the 8,557 heads of families who were urban or non-farm at the last census, only 1,674 made more than \$3,000 per year. To these favoured suburban few are open the new houses in the new subdivisions.

It seems to me that the happiest period of suburban living is the first seven or eight years of a new subdivision. All have a community of interest. Their problems are mutual. Even septic tanks which bubble out of the ground are mutual problems and become unifying social influences to suburbanites. They are usually of a similar age and income group. They are starting from scratch to build up something of their own. They are young. Everybody knows his neighbour. Doors stay open to all. There are less urban attractions, so more family life. There is more political zest. Churches are fuller. People have dogs, and green growing things. In all, life is fuller.

The disadvantages are that living is more expensive and taxes can go only up as urban scale services begin to be supplied. Some women feel marooned unless there are two cars. If there is an accident hospitals are far away. If there is a fire there is less protection. If there is social distress there is no welfare service. Septic tanks block and beds overflow. Children and dogs are always muddy. The telephone bill is unbelievable, so are the water rates. Schools are overcrowded though new. Libraries, technical schools, art galleries, big stores, movies, the university are far away. There is no public transportation.

So attractive is the suburb that many over-reach themselves economically. Tradesmen in my area find that the new suburbanite in his new house is a poor payer. Instinctively he is in competition with his neighbours. The lower income wage earners in the older areas and in the lesser houses have more money in the bank. To help pay the costs many take in boarders or even have another family share a house designed, sold and municipally designated as a single family unit. To new Canadians, for whom there are less problems of prestige, the attraction of an additional income from rents is very great. I helped a young European buy a house because he had three children and needed a whole house. He took in two boarders and converted the basement into an apartment. In the process he contravened six by-laws, and outwitted the sanitary inspector.

So attractive is the idea of the suburban single family subdivision and so greatly is home ownership built up as a shibboleth that zoning by-laws are universally overstrict. In one district of my municipality, composed of 9,000 people where no multi-family dwellings were theoretically permitted, a planning survey uncovered the fact that 30% of the dwellings were used as boarding places or multi-family dwellings.

Suburbanization by the processes I have described is like most of the activities of Canadians, extremely wasteful and expensive. It is wide open to question whether society can afford it. It results in a frightening dependence upon the motor car, everywhere the suburbanite goes he drags along with him two tons of steel which requires huge expenditures in roads and super roads and super super roads. When he gets to his destination he and the 0.7 person which on an average his two tons carries beside him need 160 sq. feet of office space per person. His two tons of steel requires 150 sq. feet. As suburbs proliferate it takes him longer and longer to get from where he lives to where he works. He goes home to a new home world, a dream world divorced from his work world by 3/4 hour of strain. He becomes slightly schizophrenic in the process. His way of life gradually bankrupts the public transportation system which can carry twenty times as many people as the car on the same area of street. Without public transportation his wife and his elder children are urged to buy cars. One industry in nine is already dependent on the car in the U.S.

The Provincial legislation, the tax base, and political institutions were written or set up before everybody had to have two tons of mobile steel. In Ontario the tax base reckoned that men would work in the municipality in which they slept and loaded municipal taxes on industry. In the outer suburbs, where municipal services have not yet been built, new industries will not locate, so a dormitory municipality grows up and runs into excessive residential taxes and lack of credit. For the two years I was Reeve of Toronto Twp. we totally prohibited subdivisions on the edge of the second fastest growing metropolis in North America. Dormitory suburbs cannot afford sewers, water or other services unless they get industry.

This means that every suburban municipality competes as in a dog fight over the bone of industrial assessment. It encourages Councils to permit industry anywhere regardless of the "The Good Life." It encourages industries to leave the city and waste the capital invested in municipal plant.

The decentralization of people and industries from the central core, the pressure on property from the daily influx of cars blights land values, increases ugliness, encourages further suburbanization and invites central urban financial distress.

The European whom I helped buy a house in Canada came, let us say, from Amsterdam. In Amsterdam they are carefully building five planned satellite suburbs each of about 40,000 population. Each is designed to be self-sufficient economically, culturally and socially. There are places of work in relation to places of residence and play. The housing is designed for all age groups and income groups in order to give a social and economic balance, and a usefulness and sound life expectancy to each suburb. But to my new Canadian the appeal of the Canadian Way with its gorgeous waste, its beautiful chrome, its space, its freedom, and its dead trees draped with transformers was infinitely superior.

Most Canadians think that with the Canadian Way, and with the Canadian suburb, there has to be economic instability of land values and social confusion. They think that there must be a continual motion of people buying, owning and selling, ever on the defensive, ever on the make. They think cities have to be ugly and that suburbs have to grow ugly. They think that improvement by planning the physical extension of towns is just one of those things which you can read about and need not believe, like regularity through prepared cereal, like beauty through soap, like no cancer through filter tips.

I don't think these things. I think we need stricter controls and broader planning and an informed foresight as to where our suburbs are taking us.

The new suburb is fine. The first eight years are fine. But what happens after 12 years when the bloom is off the suburb, when the striking new aluminum screen door with the stork on it is dated? It is just another line of single family boxes needing repainting, with taxes going up, land values going down and the elite on the move to the next one. All many a suburb has is the bloom. The bloom was put there to sell it. The man who owned the land and sold it to the developer and the developer are happy. They got their price. The owner elected the Council which let the suburb blossom. It did what was wanted of it by the people who were then resident. The interests of the people who weren't there yet were represented only by some extraordinary group of day dreamers called a "Planning Board"—and the officials of a Health Unit—and what did they matter? They should matter and I must conclude my rather too chatty remarks with some serious pleas.

Central Mortgage and Housing Corporation should change its policy and encourage not discourage the construction of the \$10,000 house. Every agency and government should encourage house construction for rent, preferably low cost row-housing for rent in green surroundings in suburbs. Every Council and Planning Board should plan suburbs as self-contained, self-sufficient neighbourhoods so that each will maintain its character and quality over the years.

The municipal tax base or the assessment method should be altered, or metropolitan government extended to the outermost fringe so that the growing sub-urban municipality is not economically starved and ill controlled in its infantile and formative years.

Increase of industrial assessment should not have to be of paramount concern to every suburb.

Money should be spent more on public transportation and less than on super roads.

Central urban areas should be redeveloped to conserve and put to full use the immense capital investments made in these areas and to discourage unnecessary suburbanization.

People should be encouraged to believe that every city street can be beautiful.

And lastly and not the least important: owners of land, developers of land, municipal councils, county councils, everybody—everybody that is who is out to build a suburb quick and cheap, they should be scared stiff of the officials of the Ontario Health Units, who are in my humble opinion far too weak and gentle with the evil doers.

Co-operative Health Plans in Canada

P. E. MEEHAN

Secretary-Treasurer

Co-operative Medical Services Federation of Ontario

Toronto, Ontario

CO-OPERATIVES are basically business organizations and produce goods or render services in much the same way as a joint stock corporation except for rules which limit the return on capital and prohibit individuals from holding more than one vote regardless of the amount of their investment.

Origins and Purpose

Medical co-operatives are "newcomers" to health insurance in Ontario. Until lately little was known about them. They are part of an economic way of life but autonomous in being free to manage their own affairs. Being neutral in matters of race, religion or politics, these medical co-operatives have been able to develop in a free atmosphere unhampered by the pressure of any vested interests. All their accomplishments were inspired by people concerned with their own social welfare, but more important, with the welfare of their families, friends, and all those living in their own community.

The original people responsible for organization and development were laymen in so far as health matters were concerned. They had a variety of occupations. To name a few of the more prominent leaders, I would mention a retail fur dealer, a lawyer, a poultry inspector, a seed merchant, a publisher, a farmer, an accountant, an engineer, a plant foreman, and an electrician. With such a cross-section of occupations, their success in launching a new type of health service was amazing.

The first recorded medical co-operative had its start in February, 1943, in Woodstock, Ontario. A group of citizens active in credit unions first developed the idea of a co-operative health insurance plan. It was called the Rochdale Hospitalization Plan and was later incorporated as Oxford Co-operative Medical Services. The charter extended its aims to surgical and medical care by prepayment. This was the beginning, and was followed by the organization of Credit Unions Mutual Benefit Association under the sponsorship of the Toronto and District Chapter of credit unions.

Present Enrolment and Financial Statistics

The latest available information shows that there are now thirty-eight medical co-operatives in Ontario with 72,000 members protecting a total of 202,000 people. In other parts of Canada there are an estimated 68,950 members protecting a total of 172,370 people. In other provinces of Canada, we know of C.U. & C. Health Services in British Columbia, La Service de Santé in Quebec, Saskatoon Medical Services in Saskatchewan, and several co-operative plans in the Maritimes and Newfoundland. The grand total of persons protected by co-operative plans would not be less than 374,370.

The latest available figures are limited to Ontario and show that an annual volume of \$1,538,886 was received in hospitalization premiums, \$1,472,831 of which was paid in claims. All "members" carry a contract for payment of hospital benefits on behalf of themselves or members of their families. They may, if they wish, add surgical protection, and \$478,196 was received for this purpose of which \$410,727 was spent on claims. This information is public knowledge because, as I have said, we are only concerned about the welfare of our members and as fast as statistics have been compiled they were freely supplied to organizations such as the Canadian Life Insurance Officers Association and the Department of National Health and Welfare.

As laymen, we have taken liberties in that wherever a system had demonstrated itself to be the most efficient or practical, we freely adopted the methods of other associations already in the health insurance business, as the means to gain our end. That end has always been the best possible service, at lowest possible cost, consistent with sound operating principles.

Benefit and Premium Structure

The prepayment system has been used successfully. Members are offered the option of a semi-private or ward hospital plan, although the distinction has not been emphasized.

We compromised between the "open end" agreement of the Blue Cross Plans and the strict indemnity scales of insurance company plans by offering a "closed end" contract which prepays rather than indemnifies but places specific limitations on the daily allowance for ordinary room rates (room, board, and ordinary nursing), and, in most but not all cases, limits were placed on hospital extras.

Using the family as the unit, and setting rates on yearly scales, we began with a \$17.00 semi-private plan and an \$11.40 ward plan. In the beginning (1943) there were 31 day contracts and rarely did the patient find any difference to pay on his bill on discharge.

This happy situation soon came to an end. We found members paying a difference on their accounts even after the yearly allowance for hospital days was extended.

Generally speaking, we have favoured a system which compels the patient to share some responsibility in the hospital account. Yearly rates are now \$30.00 and \$20.00 for semi-private and ward plan respectively, and they do not pay the full hospital bill. On the average 80% of the patient's account is met.

Administrative Organization

The first four medical co-operatives were conscious of the need for some sort of organized leadership to cope with the voluntary interest which soon developed from credit union leaders in the cities and federation of agriculture leaders in the rural areas. They pioneered the formation of the Co-operative Medical Services Federation. A dues system was instituted and each "member" association paid 10c out of the individual premium from each contract holder, within their own association. On January 1, 1951, the dues were increased to 25 cents and a full-time secretary-treasurer was hired. A research department followed.

The medical federation has concentrated its efforts towards strengthening the administrative and financial structure of the most recently formed co-operative associations. That job has been accomplished and the next step, extending present hospital contracts to include licensing to carry surgical protection, was completed just three weeks ago.

The foundation of all this development was purely voluntary, and arose from the interest of laymen—there can be no doubt about that. But paid, organized, leadership, built upon the foundation. The success in the expansion phase has been limited only by the availability of trained leaders or the assistance of leagues or federations indirectly concerned about co-operative health projects.

We have had contributions of money, or paid leadership, from the first four co-ops, as well as the Co-operative Union of Ontario, the Ontario Federation of Agriculture, and, very lately, the Ontario Federation of Labour.

I have very grave personal doubts about the feasibility of keeping the urban and rural medical co-operatives welded together in one medical federation notwithstanding the fact that the first four co-ops were divided almost equally, two of them being urban (Cumba and Wenco) and two rural (Oxford and Dufferin). As it stands now, predominantly urban medical co-operatives have increased their premiums to \$43.00 for hospital contracts and \$109.20 for "package plans" (i.e., hospital, surgical and medical care). Rural plans have remained almost standard for all practical purposes.

A "Master Plan" developed by the federation and endorsed by the first four medical co-ops called for the incorporation of a medical co-operative to serve each county in Ontario.

In actual practice certain counties were grouped together so that today one Association is now responsible for five counties. Nevertheless there are too many independent units and we know now that the bond of association was too limited. Thirty-four of the thirty-eight Ontario medical co-operatives voluntarily associate themselves with the federation, but, as a provincial organization, we cannot dictate policy to them. This has made it difficult, in some counties, to bring enrolments up to the point where peak efficiency could be realized.

Enrolment Policies and Rural Needs

On the other hand, plans such as the Lambton Co-operative Medical Services have had phenomenal success. The area was limited to Lambton County and yet 90% of the entire rural population is enrolled. No age limit has ever been placed on applicants. No contract has ever been cancelled on account of the age of the member. Four other counties (Huron, Lanark, Middlesex and Grey) are close behind Lambton in the aim of extending complete membership to rural people. When you remember that the average age of the farmer is much higher than the average age of the industrial worker, you can understand why we hold these co-operatives up as examples of what we are aiming for, and proof that through proper methods of organization no person capable of paying premiums need ever be denied health insurance.

Medical co-operation in so far as it relates to rural people has occupied most of our time and seems to be the most urgent from the standpoint of priori-

ties. We are of the opinion that rural people have been denied the benefits of group health insurance, adequate medical care, and adequate hospital facilities ever since industry has become Canada's primary source of employment. I don't think it is necessary for me to support these statements. They have already been proved by government and other surveys.

We feel that rural people themselves have found the answer in medical co-operatives. A model rural co-operative is divided into school sections, polling sub-divisions, or some other well-defined geographical sections. A group secretary is selected from each area. Premiums are paid once a year, which suits economic conditions of farmers. The farmer takes his annual premium to the group secretary at an agreed time each year. The group secretary sends the money on to the head office of the co-operative.

This system has enabled the farmer to treat himself as part of a "food factory" for insurance purposes, and as an "employee" of the "food factory" he has been able to get the benefits of employee-type protection that his friends in the city have enjoyed for years. We work in a field most other associations have avoided.

Competition and Selection of Risks

As a federation, we do object to "rate wars"—that is to say, unethical competition, including loss leaders. We have known of instances where competing plans concealed their unfavourable claims experience long enough to persuade large numbers of the buying public to enrol in their plans; then, when the gains were secured, rate increases were announced with the calculated assumption that most subscribers might protest but not cancel their new plan. Thanks to new Ontario laws this sort of malpractice is being stamped out.

We also criticize the directors of any insurance plan responsible for the system of selecting risks without regard for the needs of a community. In rural areas particularly, paid agents canvass the employers of small local industries quoting cheap rates group for medical insurance. The protection is limited to active employees, who are quite naturally in better-than-average health and a favourable age group for health insurance purposes. Such schemes leave self-employed people or older people without the benefit of group rates and often without any protection at all.

The relatively young people in small decentralized industries and retail organizations are, for the most part, the sons and daughters of farmers. We therefore feel that any system which selects risks so as to exclude the parents of employees or older people, and those who need more medical care than the average individual, is bad for a community. We feel justified in saying that health insurance is a community matter; that all people of all ages should be able to participate. We have demonstrated that such a plan is possible through county medical co-operatives.

Community-Wide Enrolment

While favouring the group secretarial system, we have agreed to enrolments through townships with premiums added to the ratepayer's tax bill. The councils of rural townships like this system because they think it will lower the

cost of indigent patients' expenses where the plan is finally extended to casual labourers residing within their areas. A casual worker is asked to pay medical insurance during the time he is earning money, thereby preventing him from becoming an indigent case should illness strike during a period of unemployment when it seems inevitable that the casual labourer is entirely without means and consequently becomes a responsibility of the township. The first such scheme originated in Finch Township in co-operation with Stor-Dun-Glen Co-operative Medical Services and it is too early to state whether such a plan will do what the councils hope it will do.

Administrative Costs

Like all prepayment plans, we keep a close watch on administrative ratios. They have averaged from 8 to 12%, depending on the size of the local association. We find that a co-operative must enrol 3,000 members before it can attain peak efficiency.

As I have already mentioned, farm people have a very different view from urban people as to how much they are prepared to pay for health insurance.

Currently they are very reluctant to pay more than \$30.00 a year. This seems to be based on two factors. First, the quality of hospital care or medical treatment is not as prompt or easy to get as it is for his friends in the city, so he finds it hard to pay for a service he might not be able to get. Second, farm income has dropped 15% and, whether we realize it or not, farmers have had a recession on their hands over the past three years—a very real one. In the face of all this, early reports indicate that the current volume of surgical premiums will be 50% over the volume for the same period last year.

Catastrophe Coverage

But the big job has been to find a way to close the gap between how much the farmer is willing to pay and the actual cost of complete medical care. As a "stop-gap" measure, we have encouraged the local societies to introduce a "catastrophic" plan. Each family is required to pay \$2.00 extra each year. The single member is required to pay \$1.00. The money is set aside into a catastrophic fund—no contract is issued and no promises are made. But each member is asked to file with the local office a complete record of his or her expenses if they exceed \$500 regardless of whether all or a portion of the bill has been paid by the co-operative. Items include special nursing. We wanted the records for our own information anyway but for purposes of a catastrophic protection we wanted to apply the fund against the aggregate costs, which exceed \$1,000. In other words, it would be a \$1,000 deductible plan.

Norfolk originated the plan, and have paid their obligations in full for three years. Sixteen other co-operatives have the plan under way and to date the scheme has been successful. We hope it is the forerunner of a Catastrophic Insurance Plan. We intend to apply for the incorporation of a company which would be licensed to issue policies for this type of protection and they would be a supplement to the existing prepaid plans. Using this method we would be starting "at the other end" of the average family's bills. The plan now protects

37,500 people. 60% to 80% of all types of medical expenses in excess of \$1,000 per family per year have been paid out of this fund.

Deductible Clauses and Preventive Measures

In the face of rising costs, the County medical co-operatives started introducing \$10 deductible clauses in their hospital contracts three years ago as an alternative to rate increases. This proved so popular that 85% of our member associations now use the system and would never go back to the days when they insured against the first ten dollars of their hospital bills.

Bruce Co-operative Medical Service asked for a report from our Central Statistical Bureau on the ages of their members and dependents. Using this data they "called up" their people by age groups, beginning with those over 60 years of age, and, under an arrangement with the local medical society, provided free medical check-ups. The doctor's fee was set at \$5 and paid out of the surplus funds of the co-operative. Five cases have already been reported of people who needed surgery or treatment but the need was not discovered until the check-up.

Conclusion

Once again I would like to emphasize the consumer's, or layman's, part in medical care.

We should remember, for example, that everything we discuss is based on the assumption that money is available to pay for medical services. When the ability to pay is impaired, all our plans are affected. We think more importance should be given to the consumer's point of view, and his everyday economic problems should have a more careful hearing. Many people tend to become experts and draw away from the average family and their common needs.

Co-operatives are only beginning to harness the great strength and resources of the consumer. But we know he responds vigorously if allowed a greater vote and voice in his own affairs.

We all know that poverty is the best friend of disease. Co-operatives are active in a great many fields of business because they recognize that a better economy which provides a high living standard, and the provision of adequate health insurance, are inseparable partners.

Concentrated Tetanus Toxoid Administered Intranasally as a Recall Dose

F. O. WISHART, M.A., M.D., D.P.H.¹

AND

M. JEAN MACQUARRIE, M.A.²

THE earliest demonstration that tetanus toxoid would serve as a secondary stimulus when instilled intranasally was that of Ramon and Zoeller (1, 2) in 1927. Other antigens were also tested by these workers and a rise in antitoxin was found to occur in response to diphtheria toxoid, scarlet fever toxin and dysentery toxin applied intranasally to previously immunized persons. A number of reports, e.g. Fraser (3) and Gold (4) have confirmed the efficacy of a recall dose of diphtheria and tetanus toxoids when applied to the nasal mucosa.

In spite of the use of a concentrated tetanus toxoid (90 Lf per ml) administered intranasally or intraocularly as a secondary stimulus, Wishart and Jackson (5) found no increase in antitoxin in the majority of a group tested and a slight rise only in the remainder. In this trial the toxoid was introduced on one occasion only whereas previous workers (1, 2, 4) employed a series of instillations. The variance in results is probably accounted for on this basis. At any rate, for the intranasal method to compare at all favourably with injection it must approach the latter in simplicity and hence it seems essential that a single application be efficacious. For this reason a reinvestigation was undertaken using a much more potent toxoid.

PROCEDURE

A group of 40 previously immunized adults (including one repeat) served as subjects. Their primary course had consisted of the subcutaneous injection of tetanus toxoid, alone, or in combination with typhoid-paratyphoid vaccine, i.e., TABT. The majority of the group had had one or more recall doses, subcutaneously. The time elapsed since their last stimulus varied from approximately 1 to 13 years.

The toxoid used was a highly purified product, concentrated to contain 1,200 Lf per ml. The dose consisted of 2 drops in each naris on one occasion only. With the subject on his back and the chin elevated, the toxoid, with a few exceptions, was dropped in at the external opening of the nares, the drops being directed towards the lateral mucosa. In a few instances direct application of the toxoid to the mucosa was made by insertion of a nasal dropper.

Blood was drawn for antitoxin titration immediately before toxoid instillation and again two weeks later.

¹Department of Hygiene and Preventive Medicine, University of Toronto.

²Connaught Medical Research Laboratories, University of Toronto.

RESULTS

The results obtained are shown in the table in which the individuals have been arbitrarily arranged in groups according to their initial titres and, in each group, in descending order of the degree of response. Also shown in the table are the intervals to the nearest year since the last previous stimulus and the reaction reported by each person.

TETANUS ANTITOXIN TITRES BEFORE AND 14 DAYS AFTER INTRANASAL TETANUS TOXOID

Group	Person	Antitoxin Units Per Ml of Serum		Years Since Last Stimulus	Reaction
		Before	After		
I	J.P.	<0.01	>3 <10	9	Nil
	R.G.R.		>3	8	Nil
	W.J.R.		>1 <3	13	Nil
	E.M.		>0.01 <0.1	6	Nil
II	J.S.M.	>0.01 <0.1	10	6	Slight headache
	K.G.		>3 <10	4	Nil
	D.M.		>1 <3	8	Nil
	J.H.		>1 <3	9	Nil
	H.T.		>1 <3	1	Nil
	G.C.F.		>1 <3	2	Nil
	M.H.B.		>0.1 <1	10	Coryza—1 week
	A.T.		>0.1 <1	7	Nil
	(F.W.W. ¹)		>0.01 <0.1	{ 7	Nil
	(F.W.W. ²)		>1 <3		Nil
III	J.R.A.	>0.1 <1	>10	9	Nil
	F.D.W.		>10	4	Nil
	A.C.I.		>10	8	Nil
	K.R.O.		>10	-	Nil
	F.O.W.		>10	3	Nil
	R.B.		10	9	Itching of eyes
	J.M.		>3 <10	8	Nil
	M.C.		>3 <10	2	Nil
	G.L.M.		>1 <3	6	Slight headache
	B.R.		>1 <3	2	Nil
	J.R.F.		>1 <3	1	Nil
	G.G.W.		>1 <3	-	Nil
	G.E.		>1 <3	6	Nil
	G.T.		1	6	Nil
	D.T.F.		>0.1 <1	2	Nil
	H.B.		>0.1 <1	2	Nil
	J.E.H.		>0.1 <1	1	"Flu"
IV	W.H.	1	>1 <3	6	Nil
	F.S.		>1 <3	6	Nil
V	B.D.H.	>1 <3	>10	1	Nil
	W.B.H.		>10	1	Nil
	G.W.M.		>3 <10	1	Nil
	R.V.		3	6	Nil
	P.T.		>1 <3	2	Nil
	G.Mc.		>1 <3	4	Nil
VI	R.J.W.	>3 <10	>10 <30	2	Nil

Antitoxin Response

As would be expected the degree of response showed great individual variation. In some, antitoxin production was very marked, as in the first few persons in Groups I, II and III. In others it was slight, as illustrated, for example, by Group IV. Still others, 6 in all, showed no response within the limits of the tests applied. Of the latter, 1 only (F.W.W.¹, Group II) had <0.1 unit initially ($>0.01 <0.1$). The other 5 already possessed a protective level of antitoxin; 3 in Group III at $>0.1 <1$ and 2 in Group V at $>1 <3$ units. An undetected response may have occurred in some of these individuals or a rather recent stimulus and a relatively high antitoxin titre may have interfered with the ability to respond in some instances. A further possibility is insufficient contact of the toxoid with the nasal mucosa.

This last consideration is given suggestive support by the case of F.W.W.¹ Intranasal instillation was repeated several months later (F.W.W.²) and two weeks thereafter his titre stood at $>1 <3$ units. In this instance the toxoid was delivered by a nasal dropper inserted to the area of the turbinates instead of being dropped in at the entrance of the nares. The dropper method seems to assure more certain contact.

Interval Since Last Stimulus

Column 5 of the table showing the interval since the last previous dose of toxoid is of some interest. It is evident that the ability to respond endures for an appreciable number of years, at least for 13 as in the case of W.J.R. Others, with intervals of 6, 7, 8, 9 and 10 years also responded satisfactorily to the intranasal recall dose.

Reactions

A glance at Column 6 of the table is sufficient to show that the majority had no untoward reaction whatever. Two persons mentioned a slight headache which disappeared in less than 24 hours. One individual developed an atypical coryza which lasted one week and which he felt was due to the toxoid. One other developed a systemic illness which appeared to be influenza which was present among his classmates at the time. Lastly, a marked itching of the eyes was experienced in the case of R.B.

Of greatest interest and significance in the matter of reactions were two individuals, M.C. and H.T. Both were extremely sensitive to tetanus toxoid subcutaneously, as little as 0.1 ml (1 Lf) of a highly purified product giving rise in them to violent local reactions. In contrast to this the intranasal toxoid produced no disturbance in either. Both showed an antitoxin response.

DISCUSSION

There is general agreement that 0.1 unit per ml of serum is a protective level of tetanus antitoxin and some suggestion that a titre of as little as 0.01 unit would suffice for protection under most circumstances. By the former criterion, only two persons, E.M. of Group I and F.W.W.¹ of Group II, were without sufficient antitoxin at two weeks after the intranasal dose. Special mention has already been made of the latter individual and his response to $>1 <3$ units as F.W.W.² noted. E.M. had served in the Merchant Navy

during World War II and one cannot be certain that he received a full primary course of tetanus toxoid in that service. This, or one of the suggestions advanced previously, could be the explanation of his feeble response from <0.01 to $>0.01 <0.1$ unit.

While the series studied is small, the results on the whole are encouraging. In only two persons is the immunity status in doubt, in 32 the antitoxin titre is 1 unit or greater and in 10 it is 10 units or more. It is quite evident that a single intranasal instillation of a potent toxoid may serve as a highly effective stimulus. More direct administration by means of a nasal dropper to ensure adequate contact of the toxoid with the mucosa might well result in all titres rising to the protective level of 0.1 unit and most, if not all, much higher. This is a matter which requires further investigation but should such prove the case the intranasal route would deserve serious consideration for routine recall purposes. However, this route would not be suitable for the "wound booster" dose since it has been shown (4) that the antitoxin response is somewhat slower than that following injection.

It was gratifying, though not surprising, to find that the intranasal route was effective after a period of many years since the last stimulus. A number of workers, including Peterson et al. (6), Moss et al. (7) and Stafford et al. (8) have demonstrated that a lapse of 5 to 10 years or more does not interfere with the capacity to respond to a recall dose of tetanus toxoid given by injection. Some years ago, Wishart and Reid (9) recorded a similar observation with diphtheria toxoid. It would appear from the present study that the intranasal route is not inferior in this respect.

It is not our intention to discuss at length the subject of reactions to tetanus toxoid. Concerning injected material Edsall (10) has remarked to the effect that during the past ten years "there has been little reason for concern regarding reactions to this product" and again that "one may hazard the guess that more will be heard about the problem of reactions to tetanus toxoid in the next ten years." A comparison of the frequency and severity of reactors to "purified" and "regular" toxoid conducted by one of us (F.O.W.) showed a marked reduction on both scores with the former product (11). Reactions still occurred, however, and in at least two persons could only be classed as severe. These two individuals were included in the present intranasal trial and neither, to our relief, experienced any reaction. A few moderate reactors were also included and were reaction free. Ramon (1, 2), Gold (4) and Fraser (3) have recorded experiences similar to ours. It seems, then, reasonable to suggest that, in respect to reactions, the intranasal is superior to the subcutaneous route.

SUMMARY

The present study, together with results recorded in the literature, gives ample evidence of the efficacy of toxoid given intranasally as a recall dose. An interval of many years since the last previous stimulus does not militate against a response. Further, from observation of individuals sensitive to tetanus toxoid subcutaneously, the intranasal route appears to have a distinct advantage in relation to the occurrence of reactions.

On the above bases plus the fact of acceptability to the "needle-shy" there is ground for advancing the use of the intranasal route. On the other hand, while the dose is small, toxoid of the potency used in this study is costly. Further, intranasal administration is somewhat more time-consuming than injection and absorption of the antigen, theoretically, at least, less certain.

While the results suggest the possible practical use of the intranasal route for routine recall doses and particularly for reactors and for apprehensive individuals, investigation of larger numbers to show with all possible certainty that persons with titres of <0.1 unit of antitoxin will respond without fail to a single application of potent toxoid seems called for.

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Canadian Journal of Public Health

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CANADA'S PROBLEM OF WATER POLLUTION

WHERE are we going in relation to one of our greatest natural resources—Water?

Coupled with its usefulness is found abuse. Abuse rises in part from thoughtlessness and in part from selfish interests. Because Canada is still a sparsely settled country the effects of abuse are frequently not too often apparent. But this is no longer true in areas of population density. Many streams which formerly served the communities along their banks are no longer sufficient in quantity or suitable in quality. Other sources of supply must be found at great expense. In the meantime, every effort is being made to utilize the existing supply to best advantage. There is no doubt that this trend will continue with expanding population and the accelerating growth of industry. The latter poses a particularly difficult problem because of the complexity of its products and incidental wastes. It is only fair to say that many industries are conscious of this problem. Similarly there is some evidence of a growing interest on the part of urban communities to provide facilities for sewage treatment. They recognize the rights of others to the further use of the streams. Unfortunately only a minority has adopted this enlightened attitude. In the meantime an increasing number of our streams are virtually open sewers.

In trying to assess the need for corrective measures, a decision must be made in regard to priority of interests. The power potential of water is well known. In areas of highest population density, water has been utilized most fully for that purpose. So much so that few hydro-electric power sites remain undeveloped within the economic range for transmitting electricity.

It should not be assumed because power development has progressed so far that it has priority of interest in water resources. While ideas may vary in respect to priority rights, certain fundamental principles have been established by law. Riparian rights is an example. This feature of English common law, is frequently the basis of suits in the courts. Professor Earle B. Phelps in his book entitled "Stream Sanitation", states that "Under the common law, a riparian owner has the right to full and uninterrupted use of the waters of his stream substantially unmodified in quality or quantity and subject to similar rights and usage on the part of other proprietors. Many other laws set forth other requirements in respect to water use. Professor Phelps further notes that "In Connecticut v.s. Massachusetts,—, the United States Supreme Court

said "Drinking and other domestic purposes are the highest uses of water. An ample supply of wholesome water is essential."

The Boundary Waters Treaty of 1909, which created the International Joint Commission, includes the following statement in Article VIII concerning priority use of boundary waters between Canada and the United States. "The following order of precedence shall be observed among the various uses enumerated hereinafter for these waters, and no use shall be permitted which tends materially to conflict with or restrain any other use which is given preference over it in this order of precedence: (1) Uses for domestic and sanitary purposes; (2) uses for navigation, including the service of canals for the purposes of navigation; (3) uses for power and for irrigation purposes."

It is evident from the foregoing quotations that our streams must be maintained in such condition that they can serve as sources of domestic water.

With the introduction of the water-carriage method of waste disposal was initiated one of the major causes of stream degradation and with it were associated many of the major outbreaks of water-borne disease. Such outbreaks were largely eliminated by various methods of water treatment including filtration and chlorination. As the pollution became more complex through the addition of industrial wastes, the need for additional treatment of domestic water became increasingly evident.

It is at this point that two schools of thought become apparent in regard to water usage. The one asserts that so long as water treatment methods are capable of producing a safe domestic water the stream should be used to its maximum capacity for waste disposal purposes. The other favors the riparian rights principle which requires that the stream be maintained "substantially unmodified in quality and quantity". There are many shades of opinion which favor an in-between policy. The justification usually given for the waste disposal policy is economics. The basis for requiring clean streams is also economy, of a different kind, but to a greater extent respect for others' rights. Few if any persons would deliberately foul a neighbor's well with body wastes, but provide the same persons with a sewer connection and they will seldom give a second thought to their neighbor in the downstream community. It is this public apathy or unconcern which must be overcome if pollution abatement of worthwhile proportions is to be achieved. As previously noted, there are some favorable indications of awakening interest.

Is there a real need for greater care of our streams and lakes? Local conditions would undoubtedly influence the answer. If the local water supply is of doubtful quality or frequently tainted by objectionable tastes and odours, unqualified approval of such action, as it refers to upstream offenders, would be forthcoming. Whether approval would extend to local pollution abatement is probably "a horse of a different colour". There is plenty of evidence that pollution abatement is urgent in some areas. Streams are known which become septic and foul smelling causing the death of much of the aquatic life. In this condition they are totally unfit for all normal use. Assuming a policy of neglect is adopted generally it is only a matter of time until others reach this deplorable state.

How much time is available? If one considers the growth of the Canadian population, the probable industrial development and the time required to install and enlarge waste treatment facilities, it is apparent that pollution abatement should receive immediate consideration and support by governments and people.

What will be the cost of corrective and preventive measures? The average smoker pays more annually for his indulgence than would be required in capital costs for complete sewage treatment works to serve him. The owner who builds his home outside a sewered area usually spends considerably more for a private sewage disposal unit than would finance his family's share of a municipal treatment plant. It is probably a fair statement that many provinces spend more in one year on highway construction than would be required to provide sewage treatment for all their municipalities. Perhaps the answer to pollution abatement is to be found in a changed sense of values. The principle of riparian rights deserves greater support so that the cry of the Ancient Mariner "Water, water everywhere, but not a drop to drink" does not become the dirge for a heritage which was given to us to maintain, not to destroy.

J. R. Menzies

ONTARIO PUBLIC HEALTH ASSOCIATION
AND
CANADIAN INSTITUTE OF SANITARY INSPECTORS
(ONTARIO BRANCH)

ANNUAL MEETING

ROYAL YORK HOTEL, TORONTO

October 6, 7 and 8, 1955

PROGRAM

THURSDAY, OCTOBER 6, 9.00 a.m.

REGISTRATION

CONVENTION FLOOR FOYER

THURSDAY, 9.30 a.m.

**MINISTER'S CONFERENCE FOR ONTARIO MEDICAL OFFICERS
OF HEALTH**

CONCERT HALL

THE HONOURABLE MACKINNON PHILLIPS, M.D., Minister of Health,
and Senior Officers of the Department of Health for Ontario.

THURSDAY, 9.30 a.m.

**CANADIAN INSTITUTE OF SANITARY INSPECTORS
(Ontario Branch)**

AND

ENVIRONMENTAL HYGIENE SECTION

LIBRARY

Presiding: MR. NORTON G. WHITAKER, Pembroke, Ontario.

Opening Remarks:

MR. F. L. LUNN, President, Ontario Branch, Canadian Institute of Sanitary Inspectors.

Some Aspects of the Mechanical Feeds on Fluoridation Units.

MR. G. M. WOOD, Wallace and Tiernan Limited.

The Efficiency of Micronization of Insecticides on Mass Fog Operations.

MR. WM. L. BARKEY, Canadian Representative, Todd Shipbuilding Company, New York.

THURSDAY, 9.30 a.m.

VETERINARY PUBLIC HEALTH SECTION

PRIVATE DINING ROOM No. 6

Presiding: DR. F. J. HARDEN, Public Health Veterinarian, Peterborough, Ontario.

Rabies Today.

DR. V. C. ROWAN WALKER, Associate Veterinarian, Connaught Medical Research Laboratory, University of Toronto.

Some Practical Aspects of Bulk Haulage of Milk.

DR. J. E. WATT, Public Health Veterinarian, Oshawa, Ontario.

New Developments in the Milking Machine Industry.

A representative of Babson Bros. Co. Limited, Toronto, Ontario.

A Food Poisoning Outbreak.

DR. DAVID GARRICK, Public Health Veterinarian, Simcoe County Health Unit, Barrie, Ontario.

THURSDAY, 12.30 p.m.

LUNCHEON

CONCERT HALL

Speaker: MISS ANNE GRANT, Health Education Consultant, Canadian Tuberculosis Association, Ottawa, Ontario.

THURSDAY, 2.00 p.m.

HEALTH OFFICERS' SECTION

CONCERT HALL

Presiding: DR. A. F. MACKEY, Medical Officer of Health, Oshawa, Ontario.

Business Session.

School Health.

DR. E. R. HARRIS, Director, Temiskaming Health Unit, Kirkland Lake, Ontario.

Maternal and Child Hygiene: Immunization and Communicable Diseases.

DR. D. V. CURREY, Director, St. Catharines-Lincoln Health Unit, St. Catharines, Ontario.

THURSDAY, 2.00 p.m.

PUBLIC HEALTH NURSING SECTION

PRIVATE DINING ROOM No. 9

Presiding: MISS VERA SMYTH, Director, Public Health Nurses, York County Health Unit, Newmarket, Ontario.

Business Session.

Report of Fact Finding Committee.

THURSDAY, 2.00 p.m.

**CANADIAN INSTITUTE OF SANITARY INSPECTORS
(Ontario Branch)**

AND

ENVIRONMENTAL HYGIENE SECTION

LIBRARY

Presiding: MR. NORTON G. WHITAKER, Pembroke, Ontario.

Some Aspects of the Toxicity of Insecticides.

MR. DONALD F. WEST, Cardel Limited, Toronto, Ontario.

Household Plumbing and its Relation to Health and Sanitation.

MR. CLIFFORD C. LLOYD, Ontario Trade School, Toronto, Ontario.

The Rat and I.

MR. C. E. BOURGALT, City of Montreal Health Department.

THURSDAY, 2.00 p.m.

DENTAL PUBLIC HEALTH SECTION

PRIVATE DINING ROOM No. 8

Presiding: DR. M. E. JARRETT, Dental Health Officer, Wellington County Health Unit, Fergus, Ontario.

Business Session.

Symposium on Conduct of Dental Health Programs.

THURSDAY, 2.00 p.m.

VETERINARY PUBLIC HEALTH SECTION

PRIVATE DINING ROOM No. 6

Presiding: DR. J. E. WATT, Public Health Veterinarian, Oshawa, Ontario.

Local Meat Inspection and Slaughter House Control—Open Discussion.

Business Session.

THURSDAY, 4.30 p.m.

ANNUAL BUSINESS MEETING

**CANADIAN INSTITUTE OF SANITARY INSPECTORS
(Ontario Branch)**

LIBRARY

THURSDAY, 7.30 p.m.

ANNUAL BUSINESS MEETING

**DIRECTORS AND OFFICERS OF THE ONTARIO PUBLIC HEALTH
ASSOCIATION**

PRESIDENT'S SUITE

FRIDAY, OCTOBER 7, 9.00 a.m.

PUBLIC HEALTH NURSING SECTION

PRIVATE DINING ROOM No. 9

Presiding: MISS VERA SMYTH, Director, Public Health Nurses, York County Health Unit, Newmarket, Ontario.

Changing Concepts with regard to Old Age.

MRS. JEAN GOOD, Executive Secretary, Division of Old Age, Welfare Council of Toronto and District.

FRIDAY, 9.00 a.m.

VETERINARY PUBLIC HEALTH SECTION

PARLOUR C

Presiding: DR. J. E. WATT, Public Health Veterinarian, Oshawa, Ontario.

Effects of Atomic Radiation on Food.

COLONEL F. C. PACE, Medical Consultant, Special Weapons Section, Civil Defence Health Service, Department of National Health and Welfare, Ottawa, Ontario.

Provincial Raw Milk Survey.

DR. G. A. EDGE, Chief Public Health Veterinarian, Ontario Department of Health, Toronto, Ontario.

Panel Discussion—Laboratory Testing of Milk.

MR. M. NIXON, Central Provincial Laboratory, Toronto, Ontario.
 MRS. A. MILLER, Director, Regional Laboratory, Peterborough, Ontario.
 DR. F. J. HARDEN, Public Health Veterinarian, Peterborough, Ontario.
 DR. M. A. COLLINS, Director, Collins Laboratory, Simcoe, Ontario.

FRIDAY, 9.00 a.m.

HEALTH OFFICERS' SECTION

BALLROOM

Presiding: DR. A. F. MACKAY, Medical Officer of Health, Oshawa, Ontario.

Administration.

DR. J. P. WELLS, Medical Officer of Health, Peterborough, Ontario.

Inspection Services of Boards of Health.

DR. R. M. KING, Director, York County Health Unit, Newmarket, Ontario.

Medical Care of Indigent and Aged.

DR. C. D. FARQUHARSON, Medical Officer of Health, Scarborough Township.

FRIDAY, 9.00 a.m.

**CANADIAN INSTITUTE OF SANITARY INSPECTORS
 (Ontario Branch)**

AND

ENVIRONMENTAL HYGIENE SECTION

LIBRARY

Presiding: MR. NORTON G. WHITAKER, Pembroke, Ontario.

Opening Remarks:

MR. T. H. JACKSON, President, Canadian Institute of Sanitary Inspectors.

The Care and Operation of Dishwashing Machines to Insure Bacteriologically Clean Dishes.

MR. HARRY PHAROAH, General Manager, Hobart Dishwashing Machine Company, Toronto, Ontario.

Sanitation in Civil Defence.

MR. THOMAS ELLIOTT, Chief Inspector, Health Department, North Bay, Ontario.

FRIDAY, 1.45 p.m.

GENERAL SESSION

BALLROOM

Presiding: MR. JOHN HOMER, President of the Ontario Public Health Association.

Medical Aspects of Water Fluoridation.

DR. M. A. COX, Hospital for Sick Children, Toronto, Ontario.

Atmospheric Pollution.

DR. MORRIS KATZ, Chairman, Canadian Section, Technical Advisory Board on Air Pollution, International Joint Commission, Ottawa, Ontario.

Some Current Views on Casualties from Nuclear Weapons.

COLONEL F. C. PACE, Medical Consultant, Special Weapons Section, Civil Defence Health Services, Department of National Health and Welfare, Ottawa, Ontario.

Annual Business Meeting, Ontario Public Health Association.

FRIDAY, 6.30 p.m.

BANQUET

BALLROOM

Presiding: DR. D. V. CURREY, Director, St. Catharines-Lincoln Health Unit, St. Catharines, Ontario.

Speaker: PROFESSOR ANTHONY ADAMSON, University of Toronto.

Subject: To be announced.

SATURDAY, OCTOBER 8

**ENVIRONMENTAL HYGIENE SECTION AND
VETERINARY PUBLIC HEALTH SECTION**

PRIVATE DINING ROOM No. 9

Presiding: DR. D. A. DAMUDE, Public Health Veterinarian, Halton County Health Unit, Milton, Ontario and MR. NORTON G. WHITAKER, Pembroke, Ontario.

Co-ordinated Action in Milk Quality.

MR. E. BIGGS, Dairy Commissioner, Ontario Department of Agriculture, Toronto, Ontario.

Report of an Investigation into a Major Outbreak of Trichinosis—illustrated with motion pictures.

MR. WM. MACDONALD, Chief Inspector, Department of Health, Sudbury, Ontario.

HOTEL ACCOMMODATION

Delegates booking rooms in the Royal York Hotel through the Ontario Public Health Association assist in defraying the cost of the Convention at no extra cost to themselves. Please write to the Secretary, Ontario Public Health Association, 465 Bay Street, Toronto, Ontario.

